

INEEL/EXT-2000-00528

Rev. 0

December 2000



Injection Well Health and Safety Plan for the Phase I Operable Unit 3-14 Remedial Investigation/ Feasibility Study

BECHTEL BWXT IDAHO, LLC

**Injection Well Health and Safety Plan
for the Phase I Operable Unit 3-14
Remedial Investigation/Feasibility Study**

Published December 2000

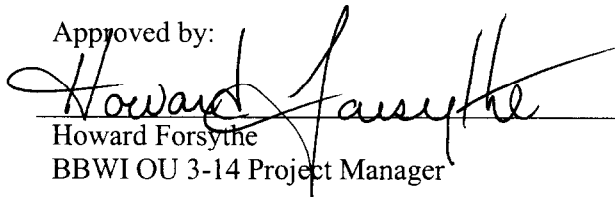
**Idaho National Engineering and Environmental Laboratory
Environmental Restoration Department
Idaho Falls, Idaho 83415**

**Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental management
Under DOE Idaho Operations Office
Contract DE-AC07-99ID13727**

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Approved by:


Howard Forsythe
BBWI OU 3-14 Project Manager

12 - 20 - 00
Date

ABSTRACT

The injection well, site CPP-23 at the Idaho Nuclear Technology and Engineering Center at the Idaho National Engineering and Environmental Laboratory, will be sampled to verify the contaminants of concern, to evaluate contamination risks, to evaluate the risk to the groundwater, and to ascertain contamination types, levels, and distribution.

This health and safety plan, as required by the Occupational Safety and Health Administration standard, 29 Code of Federal Regulations 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response," describes how health and safety risks will be eliminated or mitigated during Phase 1 drilling and sampling at the injection well site. Information from the drilling and sampling will support the Operable Unit 3-14 remedial investigation/feasibility study. This plan describes work hazards, including safety, health, and radiological hazards, as well as specific protective actions and equipment. All project activities and hazards will be evaluated in accordance with U.S. Department of Energy Order 5480.21, "Unreviewed Safety Questions." Safety and health professionals supporting project activities must determine the most appropriate hazard control and mitigation measures based on site-specific conditions and should make changes to this document, as appropriate.

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
ARDC	Administrative Record and Document Control
BBWI	Bechtel BWXT Idaho, LLC
bls	below land surface
CC	construction coordinator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CPP	(Idaho) Chemical Processing Plant (now the INTEC)
CRC	contamination reduction corridor
CRZ	contamination reduction zone
dBA	decibel A-weighted
DOE	U.S. Department of Energy
DOE-ID	DOE Idaho Operations Office
EAM	emergency action manager
ECC	emergency control center
EDF	engineering design file
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ERO	Emergency Response Organization
ES&H	environment, safety, and health
ESH&QA	environment, safety, health and quality assurance
EZ	exclusion zone

FFA/CO	Federal Facility Agreement and Consent Order
FTL	field team leader
GM	Geiger-Mueller
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high efficiency particulate air
HSO	health and safety officer
IDLH	immediately dangerous to life or health
IH	industrial hygiene, industrial hygienist
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISMS	Integrated Safety Management System
JSA	job safety analysis
MCP	management control procedure
MSDS	material safety data sheet
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
OMP	Occupational Medical Program
OSC	on-scene commander
OSHA	Occupational Safety and Health Administration
OU	operable unit
PCM	personal contamination monitor
PEL	permissible exposure limit
PM	project manager
POD	plan-of-the-day

PPE	personal protective equipment
PRD	program requirements directive
QA	quality assurance
QE	quality engineer
RADCON	radiological control
RBA	radiological buffer area
RCIMS	Radiological Control and Information Management System
RCM	radiological control manual
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RI/FS	remedial investigation/feasibility study
RWP	radiological work permit
SAD	site area director
SAP	sampling and analysis plan
SCBA	self-contained breathing apparatus
SE	safety engineer
SH&QA	safety, health, and quality assurance
SS	shift supervisor
SWP	safe work permit
SZ	support zone
TLD	thermoluminescent dosimeter
TLV	threshold limit value
TPR	technical procedure
TRAIN	training records and information network
TWA	time-weighted average
VPP	Voluntary Protection Program

WAC	waste acceptance criteria
WAG	waste area group
WCC	Warning Communications Center

Injection Well Health and Safety Plan for the Phase I Operable Unit 3-14 Remedial Investigation/Feasibility Study

1. INTRODUCTION

This health and safety plan (HASP) describes procedures and requirements for eliminating or mitigating health and safety risks associated with tasks that support the Phase I Idaho Nuclear Technology and Engineering Center (INTEC) injection well operable unit (OU) 3-14 remedial investigation/feasibility study (RI/FS) drilling and sampling project. These tasks, conducted at locations within the jurisdiction of the INTEC site area director (SAD), will be performed by employees of Bechtel BWXT Idaho, LLC (BBWI) or BBWI subcontractors.

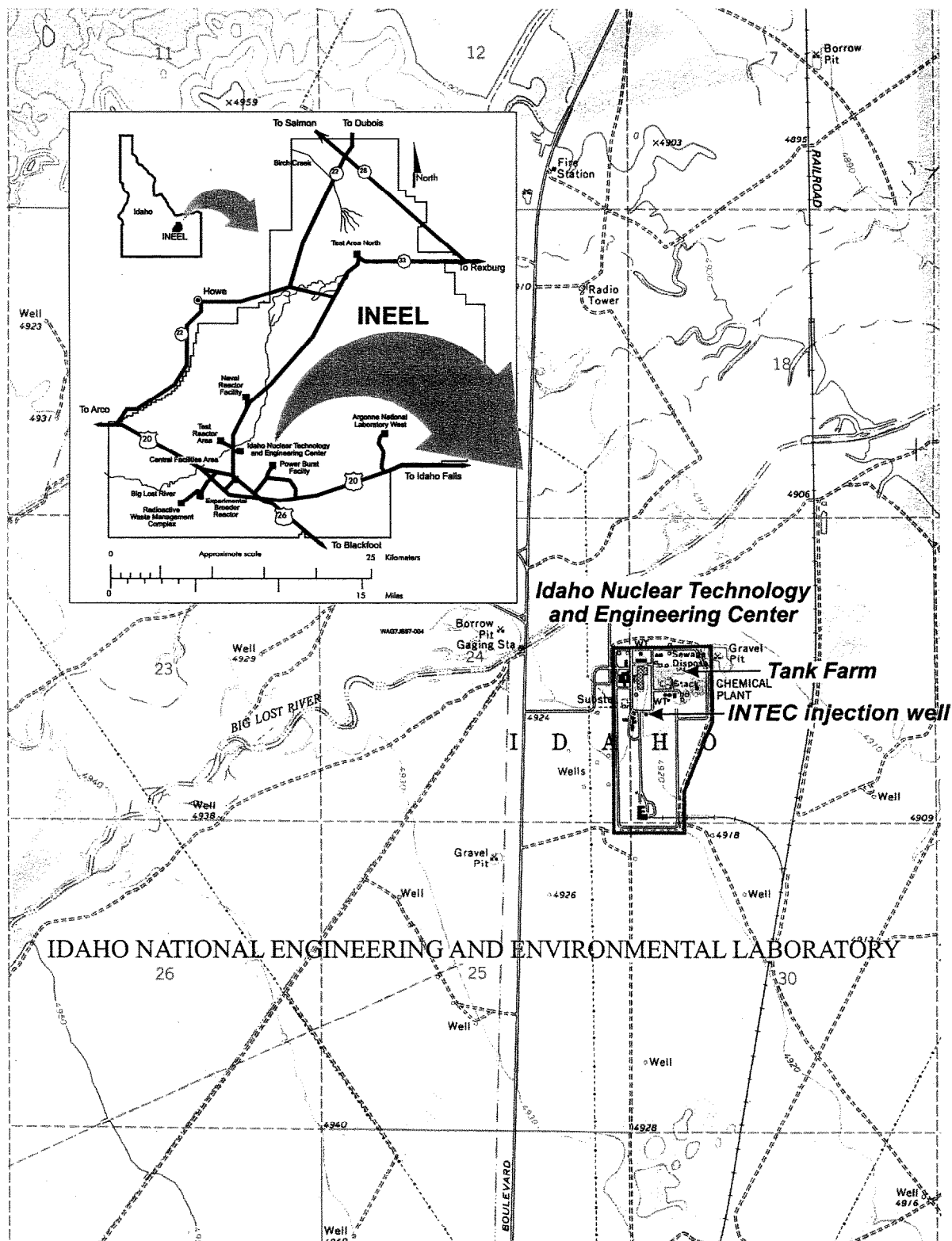
This HASP meets the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 *Code of Federal Regulations* (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)." Its preparation is consistent with information found in the National Institute of Occupational Safety and Health (NIOSH)/OSHA/United States Coast Guard /U.S. Environmental Protection Agency (EPA) *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH 1985); *BBWI Safety and Health Manual*; *BBWI Radiological Controls Manual* (BBWI Manual 15B); and *BBWI Radiation Protection Manual* (BBWI Manual 15A).

All drilling and sampling tasks and project activities and hazards have been evaluated in accordance with United States (U.S.) Department of Energy (DOE) Order 5480.21, "Unreviewed Safety Questions."

This HASP was prepared in accordance with management control procedure (MCP)-255, "Hazardous Waste Operations and Emergency Response Activity Health and Safety Plans," and reviewed according to MCP-240, "Internal/Independent Review of Documents." The health and safety officer (HSO), in conjunction with the field team leader (FTL) and the INTEC environment, safety, health, and quality assurance (ESH&QA) manager or designee, will review the HASP to ensure its effectiveness and suitability throughout the project and revise the plan if necessary. The environmental restoration (ER) safety, health, and quality assurance (SH&QA) point of contact will be added on all document action requests to revise this HASP.

1.1 INEEL Site Description

The Idaho National Engineering and Environmental Laboratory (INEEL) is a DOE-managed U.S. government test site located in southeastern Idaho, 51.5 km (32 mi) west of Idaho Falls (Figure 1-1). The INEEL encompasses approximately 2,305 km² (890 mi²) of the northeastern portion of the Eastern Snake River Plain. The Eastern Snake River Plain is a relatively flat, semiarid, sagebrush desert, with predominant relief being manifested either as volcanic buttes jutting up from the desert floor or as unevenly surfaced basalt flows or flow vents and fissures. Elevations on the INEEL range from 2,003 m (6,572 ft) in the southeast to 1,448 m (4,750 ft) in the central lowlands, with an average elevation of 1,516 m (4,975 ft). Drainage within and around the plain recharges the Snake River Plain Aquifer, which flows beneath the INEEL and surrounding area, and has been designated by the EPA as a sole source aquifer for the region. The continually saturated basalts and sedimentary interbeds



underlying INTEC are part of the Snake River Plain Aquifer. The aquifer lies at a depth of about 137 m (450 ft) beneath the site. Regional groundwater flow is southwest at average estimated velocities of 1.5 m/day (5 ft/day).

The U.S. Atomic Energy Commission initially established the INEEL in 1949 as the National Reactor Testing Station for nuclear energy research and related activities. In 1952, the INEEL expanded its function, and began accepting shipments of transuranic radionuclides and radioactive low-level waste. In 1974, it was redesignated the Idaho National Engineering Laboratory (INEL), and then the INEEL in 1997 to reflect the expansion of its mission to include a broader range of engineering and environmental management activities. Currently, the INEEL supports the engineering efforts and operations of the DOE and other federal agencies in areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials production, waste management technology development, and energy technology and conservation programs. The DOE Idaho Operations Office (DOE-ID) has responsibility for the INEEL and delegates authority to operate the INEEL to government contractors. BBWI provides managing and operating services to the majority of INEEL facilities for DOE-ID.

In November 1989, because of confirmed contaminant releases to the environment, the EPA placed the INEEL on the National Priorities List of the National Oil and Hazardous Substances Pollution Contingency Plan (54 Federal Register [FR] 48184). In response to this listing, the DOE, the EPA, and the State of Idaho (collectively called the agencies) negotiated a Federal Facility Agreement and Consent Order (FFA/CO) and Action Plan (DOE-ID 1991). The FFA/CO and Action Plan, signed in 1991 by DOE-ID, EPA, and the State of Idaho Department of Environmental Quality, established the procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the INEEL in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.), the Resource Conservation Recovery Act (RCRA) (42 USC § 6901 et seq.), and the Idaho Hazardous Waste Management Act (HWMA) (IC § 39-4401).

To better manage cleanup activities, the INEEL was divided into 10 waste area groups (WAGs); INTEC is designated as WAG 3. Each WAG contains a number of contaminant release sites grouped into OUs based on similarity of wastestreams and projected remedial actions. Fourteen OUs have been defined for WAG 3. Operable units 3-01 through 3-13 are addressed in the OU 3-13 Record of Decision (ROD) (DOE-ID 1999b). Operable Unit 3-14 will address the final action for the tank farm soil and the portion of the Snake River Plain Aquifer within the perimeter of the INTEC.

1.2 Site History

The INTEC, located in the south-central portion of the INEEL, commenced operations in 1952. Historically, the INTEC has been a uranium reprocessing facility for both defense projects and research, and was also used as a spent nuclear fuel storage facility. Irradiated defense nuclear fuels were reprocessed to recover unused uranium. Liquid waste from reprocessing was either stored at the INTEC tank farm for treatment at the calcining facility or disposed of in the INTEC injection well (CERCLA site CPP-23). After fuel dissolution and extraction, the liquid waste was calcined, and the resultant granular solids were stored in stainless steel bins. Depending on the type of fuel reprocessing, several types of high-level radioactive liquid waste has been produced at the INTEC. Phaseout of INTEC reprocessing activities began in 1992. This phaseout includes fuel dissolution, solvent extraction, product denitration, and other processes. After phaseout is complete, the INTEC mission will be to receive and store spent nuclear fuel and radioactive waste for future disposition. Figure 1-2 is a map of the INTEC.

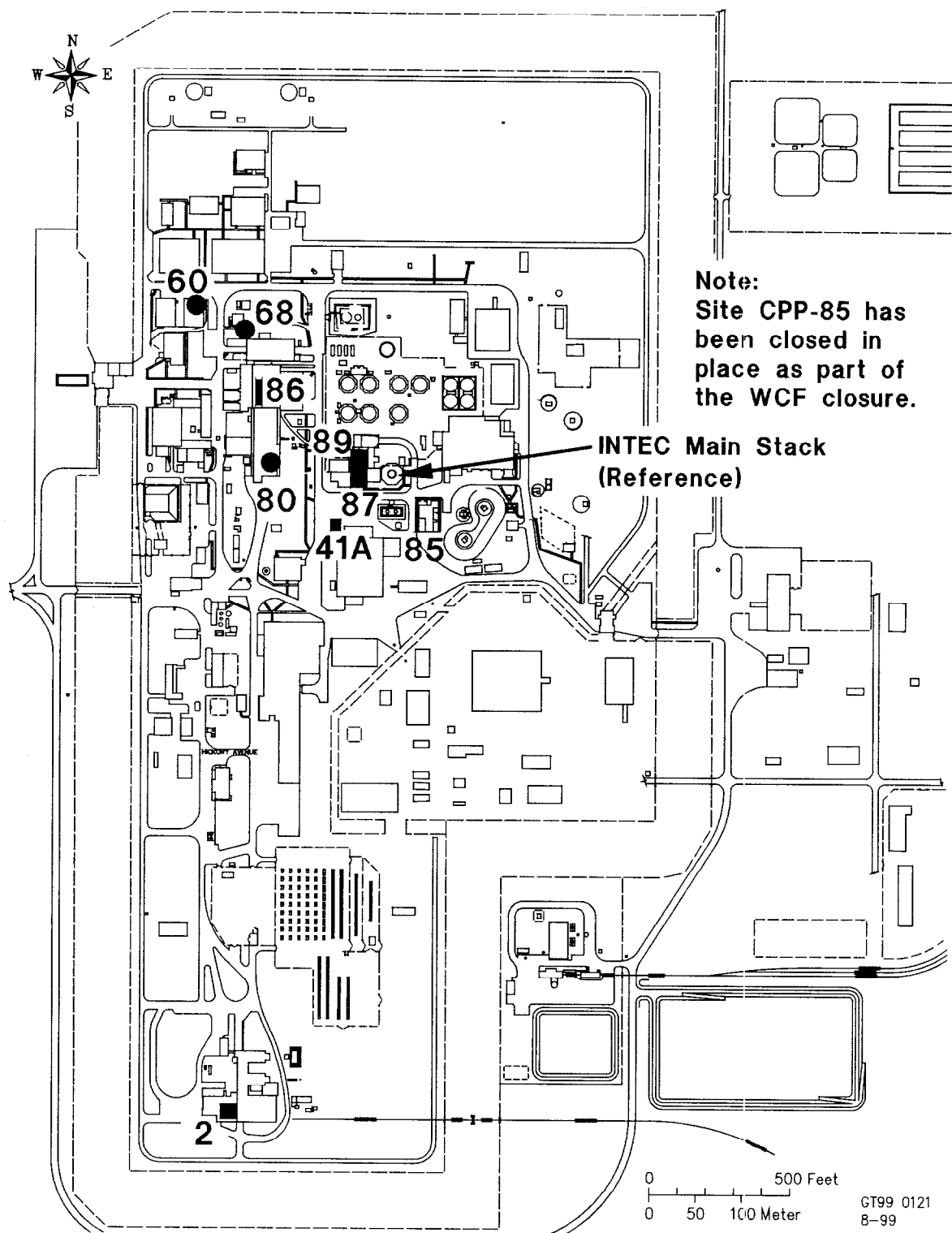


Figure 1-2. Locations of major facilities within INTEC.

The INTEC injection well (site CPP-23) was initially drilled in 1950 to a depth of 65 m (212 ft) below land surface (bls) and abandoned. Figure 1-3 shows the location of the injection well. In 1952, the borehole was cleaned out and deepened to 182 m (598 ft) bls. The 61-cm (24-in.) diameter hole was cased with 0.8-cm (5/16-in.) of carbon steel and perforated from 149 to 180 m (489 to 592 ft) bls. A second set of perforations above the water table was added after well development to provide air outlets. That set of perforations spanned from 126 to 138 m (412 to 452 ft) bls. The well had a total of 1.5 m² (16 ft²) of perforations below the water table and 0.5 m² (6 ft²) above the water table.

The INTEC injection well (site CPP-23) was the primary waste disposal location from 1952 through February 1984, and was used intermittently for emergency disposal situations until 1986. The average discharge to the well during this period was approximately 1.4 billion L/year (363 million (M) gal/year) or about 3.8 M L/day (1 M gal/day) (DOE-ID 1997a). An estimated total of 22,000 Ci of radioactive contaminants have been released in 4.2×10^{10} L (1.1×10^{10} gal) of water (WINCO 1994). The injection effect of the well created high groundwater velocities immediately around the release point, with velocities of as much as 1,524 m (5,000 ft) per day. This effect became insignificant at distances greater than 305 m (1,000 ft) from the disposal well. Water initially moved radially from the well for some distance, overriding the regional flow direction. The majority of the radioactivity is attributed to tritium (H-3) (approximately 96%), with minor components of Am-241, Tc-99, Sr-90, Cs-137, I-129, and Pu isotopes. Other contaminants known to have been disposed of in the INTEC injection well (Site CPP-23) are Co-60, Eu-152/154, arsenic, chromium, mercury, nitrates and nitrites, and osmium.

Two intervals of casing disintegration (1967 or 1968 and 1981) and subsequent repair (1971 and 1982) occurred. During periods when the INTEC injection well (site CPP-23) was plugged, the waste was discharged directly into the vadose zone, which resulted in a thick zone of contamination underlying INTEC. This zone serves as a possible path of contamination to the deep perched water zone and complicates any interpretation of contamination in the subsurface.

1.3 Scope of Work

The scope of work for the Phase I INTEC injection well drilling and sampling project for the OU 3-14 RI/FS is described below and includes all tasks. The purpose for collecting samples is to verify the contaminants of concern at the site; to understand the contamination types, levels, and distribution; to evaluate the risks associated with the contamination from the INTEC injection well (site CPP-23); and to evaluate the risk to the groundwater within the INTEC fence. No monitoring wells or data points are close enough to the injection well to address these concerns, and previous and historical data are incomplete. Figure 1-4 shows a conceptual model of the INTEC injection well.

Data collection tasks include:

- Drilling (air rotary) a 91.4-cm (36-in.) or larger borehole into the abandoned INTEC injection well (site CPP-23) vault cement cap and gravel fill from the land surface to a depth of approximately 6.1m (20 ft) bls or to the top of the cement well plug. A Dust Hog containment system, supplied by the contractor, will be used to limit contamination from cuttings released to the atmosphere or surface. The cuttings will be containerized and monitored for radiation.. Vacuum extraction will remove any gravel encountered in the area of the vault. To locate the existing injection well casings, the 91.4-cm (36-in.) or larger borehole will be drilled at approximately 6.1 m (20 ft) bls. After the well casing is located, the drill rig will be set up over the location of the injection well for further drilling. A borehole of at least 20.3 cm (8 in.) will be advanced inside the center 25.4 cm (10 in.) casing of the abandoned injection well to approximately 1.5 m (5 ft) into the cement plug (approximately 6.1 to 7.6 m [20 to 25 ft] bls). The subcontractor will supply and install

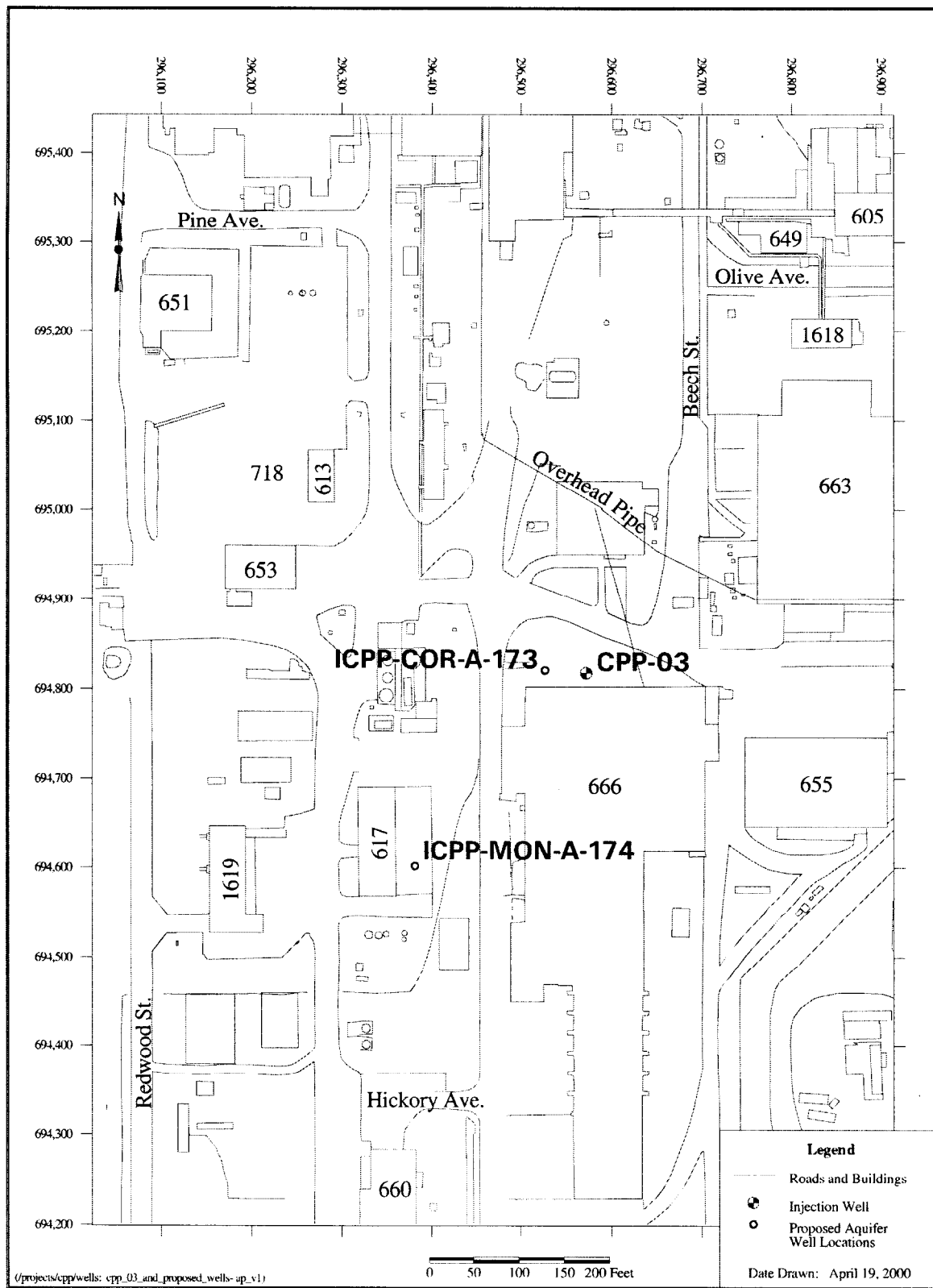


Figure 1-3. Location of WAG 3 OU 3-14 INTEC injection well (site CPP-23), identified in this figure s as CPP-03.

- a carbon steel surface casing of at least 15.2 cm (6 in.) (American Standards for Testing and Materials [ASTM] A53, single V-groove weld connections).
- Grouting the 15.2-cm (6-in.) steel casing in place by filling the annulus between the casing and the gravel fill with a grout mixture of Type I or Type II cement, 5% granular sodium bentonite, and 7 to 9 gallons of water per 94-lb bag of cement (supplied by the subcontractor).
- Drilling out any grout from inside the surface casing and advancing (reverse circulation air rotary) a 10.2-cm (4-in.) borehole to an approximate depth of 137.2 m (450 ft) bls.
- Upon reaching a depth of 137.2 m (450 ft), installing a conductor pipe (supplied by the subcontractor) in the borehole. The conductor pipe is to be large enough to accommodate NX-size (2-in. OD) coring activities. The NX-sized corehole will be advanced through the center of the inside 25.4-cm (10-in.) injection well casing to the basalt at the bottom of the abandoned injection well. The contractor will screen and survey for radionuclides throughout coring operations, and the screens and surveys will be analyzed to determine the presence or absence of radionuclide contaminants.
- Coring the cement and basalt by taking a continuous 1.5-m (5-ft) core sample using a bottom-discharge rotary diamond bit and wireline core recovery system. The subcontractor will furnish a minimum of five wireline core recovery barrels (5-ft split barrels) for all coring operations. Cores will be withdrawn at the first sign of blockage or grinding. If core recovery is poor or breakage is excessive, the subcontractor will make every effort to improve the recovery and sample quality by changing bits, changing bit types, altering drilling rates, shortening runs, changing drilling fluid (water) circulation, or other methods that might improve quality. No drilling fluid other than air or water will be allowed.
- After coring reaches the appropriate depth, the corehole/borehole will remain open until sampling data have been reviewed.

Samples will be collected, preserved, and shipped to an analytical laboratory. Samples will be collected as stated in the Phase I INTEC injection well Field Sampling Plan (FSP) for the OU 3-14 RI/FS (DOE-ID 2000b).

1.3.1 Injection Well (Site CPP-23) Sampling

One borehole will be advanced directly into the INTEC injection well site (CPP-23), and two groundwater monitoring wells will be installed in the vicinity of the INTEC injection well.

Samples will be collected from the borehole and the two monitoring wells in accordance with the Phase I INTEC injection well FSP for the OU 3-14 RI/FS (DOE-ID 2000b). Core samples will be collected and archived. Analysis of selective cores will include radiological, inorganic, and organic contaminant screening. Following installation, wells will be logged using standard gamma-detection instruments. Sludge and groundwater samples will be preserved, packaged, and prepared for shipment to the analytical laboratory.

The FTL will provide oversight for all sampling tasks and ensure all sample collection, preservation, handling, and shipping procedures are followed in accordance with the Phase I INTEC injection well FSP for the OU 3-14 RI/FS (DOE-ID 2000b).

1.3.2 Personal Protective Equipment and Miscellaneous Debris Sampling

Personal protective equipment (PPE) and miscellaneous debris (including investigation-derived waste) from the Phase I INTEC injection well drilling and sampling tasks (DOE-ID 2000c) for the OU 3-14 RI/FS (DOE-ID 2000a) may be sampled for constituents of concern in support of a hazardous waste determination for final disposition.

1.4 Ancillary Activities

Ancillary activities prior to the start of this project include:

- Preparing National Environmental Policy Act (NEPA) (42 USC § 4321 et seq.) documentation, including an environmental checklist
- Preparing work control documentation or integrated planning sheets
- Completing a hazards screening checklist and job walk-down in accordance with appropriate work control procedures (see STD-101)
- Preparing a job safety analysis (JSA)
- Comparing project activities to the activities analyzed in the INTEC Safety Analysis Report (LMITCO 1997) and, if necessary, completing an unreviewed safety question form.)
- Preparing a waste characterization report and Form L-0435 for waste disposal (as required).

2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure for this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. Job titles of the individuals in key roles at the work site and lines of responsibility and communication are shown on the organizational chart for the site (Figure 2-1). The following sections outline the responsibilities of key site personnel.

2.1 ER Program and Project Management

2.1.1 Environmental Restoration Director

The ER director has the ultimate responsibility for the technical quality of all projects, maintaining a safe environment, and ensuring the safety and health of all personnel during field activities performed by or for the INEEL ER program. The ER director provides technical coordination and interfaces with the DOE-ID Environmental Support Office. The ER director is responsible for ensuring:

- Project and program activities adhere to all applicable federal, state, local, and company requirements and agreements
- Program budgets and schedules are approved and monitored to be within budgetary guidelines
- Personnel, equipment, subcontractors, and services are available when needed
- Direction is provided for task development, findings evaluation, conclusions and recommendations development, and reports production
- Activities are reviewed in accordance with MCP-3562 (as applicable) prior to commencing work activities.

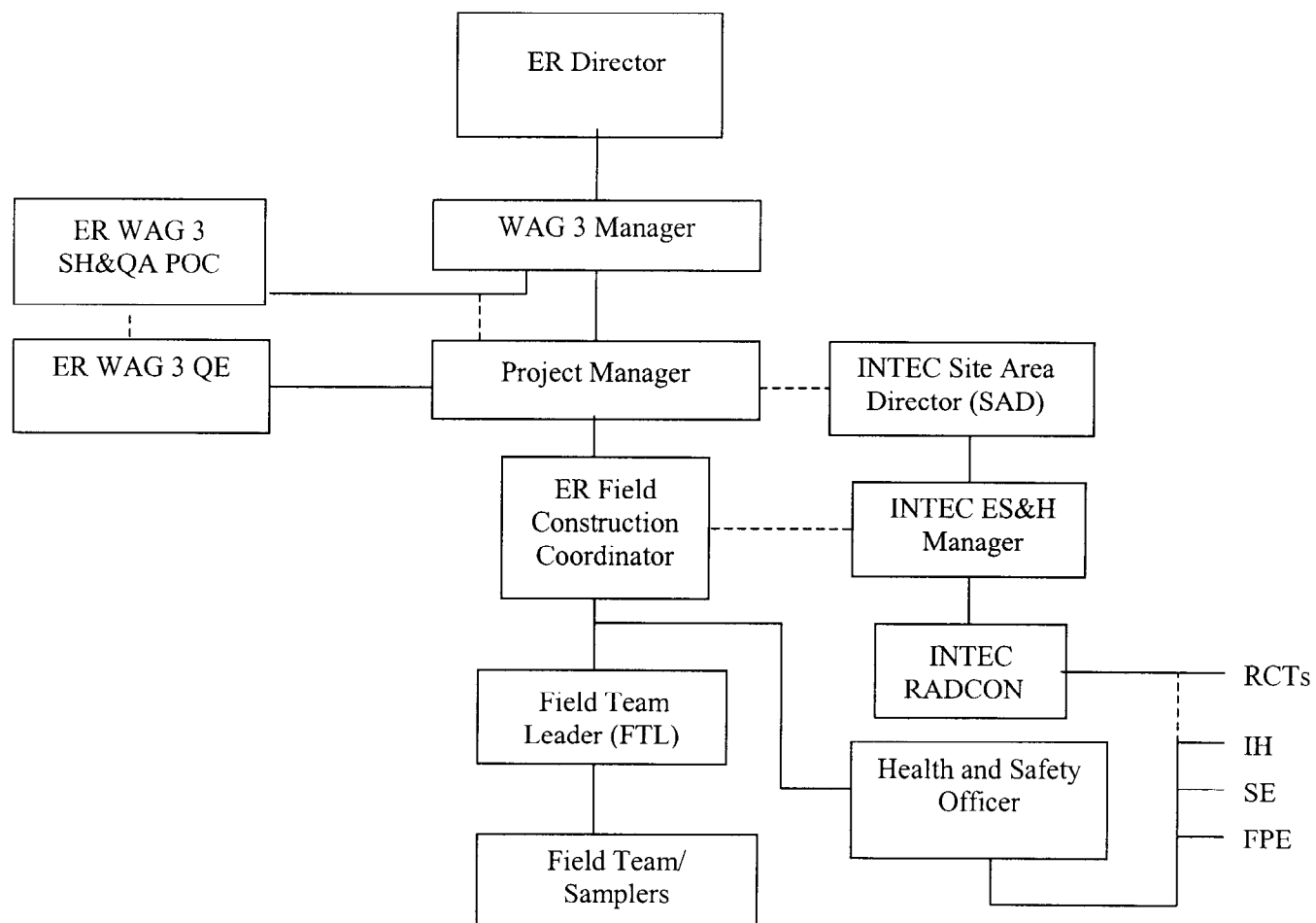
2.1.2 ER Environmental Safety and Health Manager

The ER environmental safety and health (ES&H) manager or designee is responsible for managing ES&H resources to ensure that ES&H programs, policies, standards, procedures, and mandatory requirements are included in plans and schedules and are adhered to in day-to-day operations. Through technical and administrative direction to subordinate staff and coordination with related functional entities, the ER ES&H manager ensures that all activities comply with ES&H programs, policies, standards, procedures, and mandatory requirements. .

The ER ES&H manager reports directly to the ER director. Under the direction of the ER director, the ES&H manager represents the directorate in all ES&H matters, including responsibility for ES&H management compliance and oversight for all ER operations.

The ES&H manager is responsible for management of the following technical disciplines and implementation of programs related to these disciplines:

- Radiological control (RADCON) personnel (INTEC support)



Line of Authority _____

Line of Communication - - - - -

Figure 2-1. Organizational chart for the Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS.

- Environmental support personnel
- Industrial safety personnel (matrixed)
- Fire protection personnel
- Quality assurance (QA) personnel
- Industrial hygiene (IH) personnel (matrixed)
- Emergency preparedness personnel (matrixed).

2.1.3 Environmental Restoration Project Manager

The ER project manager (PM) ensures that all project activities comply with (1) BBWI MCPs and program requirements directives (PRDs); (2) all applicable OSHA, EPA, DOE, U.S. Department of Transportation, and State of Idaho requirements; and (3) the *Implementation Project Management Plan for the Idaho National Engineering and Environmental Laboratory Remediation Program* (LMITCO 1998), the Quality Assurance Project Plan for WAGs 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites (DOE-ID 2000d), this HASP, and the FSP, which constitute the sampling and analysis plan (SAP) required by the FFA/CO (DOE-ID 1991).

The PM is responsible for the overall work scope, schedule, and budget. The PM is responsible for (1) developing resource-loaded, time-phased control account plans based on the project technical requirements, budgets, and schedules and (2) assigning project tasks. The PM coordinates all document preparation, and field, laboratory, and modeling activities. The PM will implement the project requirements and ensure work is performed as planned.

The PM will ensure that an employee job function evaluation (Form 340.02) is completed for all project employees, reviewed by the project IH for validation, and then submitted to the Occupational Medical Program (OMP), which will determine if a medical evaluation is necessary.

Other functions and responsibilities of the PM:

- Developing the documentation required to support the project
- Ensuring the technical review and acceptance of all project documentation
- Developing the site-specific plans required by the ER program, such as work plans, ES&H plans, and FSPs
- Ensuring that project activities and deliverables meet schedule and scope requirements, as described in the FFA/CO, Attachment A, "Action Plan for Implementation of the Federal Facility Agreement and Consent Order" (DOE-ID 1991), and applicable guidance
- Identifying the requirements for, scheduling, and supporting the CERCLA and NEPA public review and comment process
- Ensuring that the hazards checklist and JSA is completed, as required by PRD-25, "Activity Level Hazard Identification, Analysis, and Control"

- Identifying subproject technology needs
- Coordinating and interfacing with the units within the program support organization on issues relating to QA, ES&H, and NEPA support for the project
- Coordinating the site-specific data collection, review for technical adequacy, and data input to an approved database, such as the Environmental Restoration Information System (ERIS)
- Coordinating and interfacing with subcontractors to ensure milestones are met, adequate management support is in place, technical scope is planned and executed appropriately, and project costs are kept within budget.

2.1.4 ER WAG 3 SH&QA Point of Contact

The ER WAG 3 SH&QA point of contact or designee is responsible for management of SH&QA resources to ensure that SH&QA programs, policies, standards, procedures, and mandatory requirements are implemented in all WAG 3 day-to-day operations. The WAG 3 SH&QA point of contact directs SH&QA compliance activities by providing technical and administrative direction to project staff and through coordination with related INTEC SH&QA personnel. The WAG 3 SH&QA point of contact reports directly to the WAG 3 manager. The WAG 3 SH&QA point of contact represents the WAG 3 manager in all SH&QA matters including planning, compliance, and oversight of project activity at INTEC CERCLA sites.

2.1.5 Environmental Coordinator

The assigned environmental coordinator oversees and monitors site activities to ensure compliance with DOE orders, EPA requirements, and other environmental regulations. . The project environmental coordinator provides support surveillance services for hazardous waste storage and transportation, and surface water and storm water runoff control. The project environmental coordinator advises the PM and FTL about environmental issues and concerns

2.1.6 Quality Engineer

A quality engineer (QE) provides guidance on task-site quality issues, when requested. The QE may periodically observe task site activities and verify that site operations comply with quality requirements pertaining to these activities. The QE will determine the quality level and prepare inspection criteria for materials procured in support of the Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS.

2.2 Project Field Personnel

2.2.1 ER Field Construction Coordinator

The ER field construction coordinator (CC) has ultimate responsibility for safe and successful completion of assigned project tasks. The ER field CC manages field operations, executes the work plan, enforces site control, and ensures prejob briefings are conducted in accordance with MCP-3003, "Prejob and Post-Job Briefings." All safety issues must be brought to the attention of the ER field CC. The ER CC will work with the FTL, HSO, and RADCON personnel to resolve safety and health issues.

2.2.2 Field Team Leader

The FTL represents the ER organization at the site with delegated responsibility for the safe and successful completion of the project. The FTL manages sampling operations and executes the SAP, enforces site control, documents work site activities, ensures that the necessary equipment and facilities are made available to implement the work as described in this plan, and may conduct the plan-of-the-day (POD) briefings at the start of the shift. All health and safety issues must be brought to the attention of the FTL. The FTL may also serve in a technical support capacity at the INTEC command post during an emergency event.

Project work will require equipment operators, laborers, or other crafts. A representative from the organization supplying these additional workers will interface with the FTL to provide work supervision. Additionally, the FTL will be the primary interface with subcontractor personnel at the project site.

Additional responsibilities include but are not limited to:

- Ensuring that sampling activities adhere to technical and operational requirements
- Conducting field analyses and decontamination activities
- Complying with equipment removal procedures
- Packaging and shipping samples
- Determining, in conjunction with the site IH and radiological control technician (RCT), the level of PPE necessary for the task
- Ensuring compliance with field documentation, sampling methods, and chain-of-custody requirements
- Ensuring “fit for duty” medical evaluation forms are completed for all project employees, reviewed by the project IH for validation, and then incorporated into the project field file.

If the FTL leaves the site, an alternate individual will be appointed to act as the FTL. Persons acting as the FTL must meet all FTL training requirements outlined in Section 4 of this HASP. The identity of the acting FTL will be communicated to site personnel and recorded in the FTL logbook. The FTL may be a subcontractor.

2.2.3 Health and Safety Officer

The health and safety officer (HSO) is the primary contact for all health and safety issues. The HSO advises the FTL on all aspects of health and safety and is authorized to stop work at the task site if any operation threatens worker or public health or safety. In addition, the HSO is authorized to verify compliance with the requirements and procedures described in the HASP, to conduct conformance inspections and self-assessments, to require and monitor corrective actions, and to monitor decontamination procedures, as appropriate.

Other ES&H professionals at the task site (including the safety engineer [SE], IH, RCT, radiological engineer, environmental coordinator, and facility representative) support the HSO, as necessary.

The assigned HSO or alternate must be qualified (pursuant to the OSHA definition) to recognize and evaluate hazards. The HSO will be given the authority to take or direct actions to ensure that workers are protected. While the HSO may also be the IH, SE, or, in some cases, the FTL (depending on the hazards, complexity, and size of the activity), the HSO role must not conflict philosophically with other task site responsibilities or add a significant volume of work. If the HSO has to leave the site, the HSO will appoint an alternate, and the identity of the acting HSO will be recorded in the FTL logbook and communicated to task-site personnel.

The HSO ensures that appropriate ESH&QA personnel participate in the development and verification of the hazards screening profile checklist in accordance with MCP-3562, and with any subsequent JSA.

2.2.4 Industrial Hygienist

The assigned IH is the primary source of information regarding nonradiological hazardous and toxic agents at the work site. The IH assesses the potential for worker exposure to hazardous agents according to the BBWI *Safety and Health Manual*, MCPs, and accepted industry IH practices and protocols. Through participation in site characterization, the IH assesses and recommends appropriate hazard controls for the protection of work site personnel, signs safe work permits (SWPs) as required, operates and maintains airborne sampling and monitoring equipment, reviews engineering controls for effectiveness, and recommends and assesses the use of PPE, recommending changes as appropriate.

The IH will review all employee job function evaluations, Form 340.02, to validate that management has completed the form. After validation, the IH will send the form to occupational medical program (OMP).

After a project site evacuation, the IH, in conjunction with other recovery team members, helps the FTL determine if reentry is safe as described in Section 11. The IH (or the HSO or applicable supervisor) will refer to the OMP any personnel showing health effects (signs and symptoms) resulting from possible exposure to hazardous agents.

The IH may have other duties at the task site, as described in other sections of this HASP or in BBWI PRDs and/or MCPs. During emergencies involving hazardous materials, IH airborne sampling and monitoring results will be communicated to members of the INTEC and INEEL emergency response organizations (EROs).

2.2.5 Safety Engineer

The assigned SE reviews work packages, observes site activity, assesses compliance with the BBWI *Safety and Health Manual*, signs SWPs (if required), advises the FTL and HSO about required safety equipment, answers questions about safety issues and concerns, and recommends solutions to safety issues and concerns. The SE may periodically inspect in accordance with MCP-3449, "Safety and Health Inspections," and have other duties at the task site as described in other sections of this HASP or in BBWI PRDs and/or MCPs. Copies of SE inspections will be kept in the project field file.

2.2.6 Fire Protection Engineer

The assigned fire protection engineer reviews the work packages, conducts preoperational and operational fire hazard assessments (as required), and provides technical guidance to site personnel regarding all fire protection issues.

2.2.7 Sampling Team

The sampling team will perform the onsite tasks necessary to collect the samples to meet the data quality objectives of the SAP. The sampling team will consist of field team members and will be led by the FTL. All sampling activities will be conducted in accordance with the Phase I INTEC injection well FSP for the OU 3-14 RI/FS (DOE-ID 2000b). The IH and RADCON personnel will support the sampling team as warranted based on site-specific hazards and task evolutions.

2.2.8 Field Team Members

All field team members, including BBWI and subcontractor personnel, will understand and comply with the requirements described in this HASP. The FTL or HSO will conduct the POD briefing at the start of each shift. During the POD briefing, all daily tasks, associated hazards, hazard mitigation (e.g., engineering and administrative controls, required PPE, work control documents), and emergency conditions and actions will be discussed. The project HSO, the IH, and RADCON personnel will provide input to clarify task health and safety requirements. All personnel are encouraged to ask questions regarding site tasks and suggest ways to do the tasks more safely and effectively based on the lessons learned from previous day's activities. The POD will be documented in the FTL logbook.

Once at the site, personnel are responsible for identifying any potentially unsafe situations or conditions to the FTL or HSO for corrective action. **If it is perceived that an unsafe condition poses an imminent danger, site personnel are authorized to stop work immediately, then notify the ER CC, FTL, or HSO.**

2.2.9 Nonfield Team Members

People onsite who are not part of the field team are considered nonfield team members (workers onsite only occasionally for a specific task, e.g., equipment operators or other craft personnel not assigned to the project). A person in or beyond the designated support zone (SZ) is considered to be onsite. Nonfield team members are considered occasional site workers under 29 CFR 1910.120–1926.65, “Hazardous Waste Operations and Emergency Response,” and must receive site-specific HASP training prior to entering beyond the SZ of the project site. They must also have all required training for the area of the site they have a need to access, based on the tasks taking place, as identified in Section 4. In addition, a site supervisor (e.g., HSO or FTL) will supervise nonfield team personnel who have not completed 3 days of supervised field experience in accordance with the HAZWOPER standard (29 CFR 1910.120(e)).

2.2.10 Visitors

All visitors with official business at the project sites (including BBWI personnel and representatives of DOE and other state or federal regulatory agencies) may not proceed beyond the SZ without receiving a site-specific briefing, meeting PPE requirements, and providing proof of training. Additional requirements include:

- Receiving site-specific HASP training (or hazard briefing based on specific tasks). Access to other controlled areas during downtime or low-hazard tasks (no potential for exposure above action limits or significant safety hazards) may only require a hazard briefing
- Signing a HASP training acknowledgment form or providing proof of meeting all training requirements described in Section 4 of this HASP (or required training for the area to be accessed during downtime or low-hazard activities)

- Signing applicable work controls documents (e.g., radiological work permits [RWP], SWP, and a JSA for the area to be accessed)
- Wearing the appropriate PPE.

A fully trained task site representative (such as the FTL or HSO, or a designated alternate) will escort visitors entering the project site beyond the SZ if the visitors do not have objective evidence of meeting the 24-hour supervised field experience requirement (29 CFR 1910.120(e)), as site conditions warrant, and as deemed appropriate by the FTL.

Visitors may not be allowed beyond the SZ during certain high-hazard project site tasks (soil vacuuming, logging, drilling, or equipment movement) to minimize safety and health hazards. The FTL and HSO, in conjunction with INTEC RADCON personnel if appropriate, will determine a visitor's need for access beyond the SZ. Visitors who do not have a specific task or official business are not permitted at the project site.

2.3 INTEC Personnel

2.3.1 INTEC Site Area Director

The INTEC SAD reports to the director of site operations and interfaces with the INTEC facility manager. The INTEC SAD is responsible for several functions and processes in the INTEC area that include the following:

- Approving all work packages/control documents
- Establishing and executing a monthly, weekly, and daily operating plan
- Executing the ESH&QA program
- Executing the Integrated Safety Management System (ISMS)
- Executing enhanced work planning
- Executing the Voluntary Protection Program (VPP)
- Ensuring environmental compliance
- Executing that portion of the voluntary compliance order that pertains to the INTEC area
- Correcting the root cause functions of the accident investigation
- Reporting (e.g., to DOE-ID) following an accident or spill.

2.3.2 INTEC Facility Manager

The INTEC facility manager is responsible for maintaining the assigned facility and must be cognizant of work being conducted in the facility. The INTEC facility manager is responsible for the safety of personnel and the safe completion of all project activities conducted within the area in accordance with the INEEL SAD concept.

The facility manager and INTEC shift supervisor (SS) will be kept informed of all Phase I INTEC injection well tasks. The INTEC SS and FTL will agree on a schedule for reporting work progress and plans for work. The INTEC SS will serve as a contact to task site personnel with regard to INTEC operations.

2.3.3 Radiological Engineer

The radiological engineer is the primary source of information and guidance relative to the evaluation and control of radioactive hazards at the site. The radiological engineer will provide engineering design criteria, review of contamination controls, and make recommendations to minimize health and safety risks to site personnel.

Responsibilities of the radiological engineer include (1) performing radiation exposure estimates and as low as reasonably achievable (ALARA) evaluations, (2) identifying the type(s) of radiological monitoring equipment necessary for the work, (3) advising the HSO and RCT of changes in monitoring or PPE, and (4) advising personnel on the site evacuation and reentry (if necessary). The radiological engineer may also have other duties as described in other sections of this HASP or in the BBWI *Radiation Protection Manual*. Only initial work package and occasional radiological engineer support is anticipated for this project.

2.3.4 Radiological Control Technician

The assigned RCT is the primary source of information and guidance on radiological hazards that may be encountered during drilling and sampling tasks. RCT responsibilities include (1) radiological surveying of the site, equipment, and samples; (2) providing guidance for radioactive decontamination of equipment and personnel; and (3) accompanying the affected personnel to the nearest INEEL medical facility for evaluation if significant radionuclide contamination occurs.

The RCT must notify the HSO and FTL of any radiological occurrence that must be reported as directed by the BBWI *Radiation Protection Manual*. The RCT may have other duties at the site as described in other sections of this HASP or in BBWI PRDs and/or MCPs. It is anticipated that sampling tasks will require full-time coverage by an RCT. However, the final determination of RADCON coverage will be specified in the RWP.

3. RECORDKEEPING REQUIREMENTS

3.1 Industrial Hygiene and Radiological Monitoring Records

The IH will record airborne monitoring and sampling data (both area and personal) and input the information into the Hazards Assessment and Sampling System (HASS). All monitoring and sampling equipment will be maintained and calibrated in accordance with BBWI procedures and manufacturer specifications. Industrial hygiene airborne monitoring and sampling data are treated as limited access information and maintained by the IH in accordance with BBWI *Safety and Health Manual* procedures.

The RCT maintains a logbook of all radiological monitoring, daily site operational activities, and instrument calibrations of instruments used to document detection levels or field screen samples. Radiological monitoring records are maintained according to the BBWI *Radiation Protection Manual* and MCP-9, "Maintaining the Radiological Logbook."

Site personnel (or their labor representative) have a right to both IH and RCT monitoring and sampling (both area and personal) data. Results from monitoring will be communicated to all field personnel during daily POD meetings and formal prejob briefings, in accordance with MCP-3003, "Performing Prejob Briefings and Post-Job Reviews."

3.2 FTL Logbook and Site Attendance Record

The FTL will record in the FTL logbook daily task site events and will record in a site attendance logbook all personnel (workers and nonworkers) who are onsite each day. The logbooks (FTL and site attendance) must be obtained from Administrative Record and Document Control (ARDC). Completed logbooks are submitted to the ARDC at the project's completion. Logbooks will be maintained in accordance with MCP-231, "Logbooks for ER and D&D&D Projects."

The site attendance logbook must note all personnel who access the project site, and the logbook will be used for accountability in case of a site evacuation. Section 11 provides additional information regarding personnel accountability requirements.

3.3 Administrative Record and Document Control Office

The ARDC will organize and maintain data and reports generated by field activities. The ARDC maintains a supply of all controlled documents and provides a documented system for the control and release of controlled documents, reports, and records. The ARDC maintains in the project file copies of the management plans, this HASP, the quality program plan, the quality assurance project plan, and other documents pertaining to this work. . All project records and logbooks, except IH and RCT logbooks, must be forwarded to the ARDC within 30 days after completion of field activities.

4. PERSONNEL TRAINING

All site personnel will receive training specified in OSHA, 29 CFR 1910.120/1926.65, and the BBWI *Safety and Health Manuals*. Radiation workers will be trained according to the BBWI *Radiation Protection Manual*, MCP-126, "Radiological Training." Table 4-1 summarizes the Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling site-specific training requirements for personnel. Specific requirements for personnel requiring access to the project site may vary depending on the hazards associated with their individual job assignment and required access into established controlled work areas. Table 4-1 lists only project-specific training and does not include all potential INTEC or other general BBWI training that may be required.

4.1 General Training

Proof that all required site-specific training has been completed (including applicable refresher training) must be maintained at the project site or be available electronically (e.g., on TRAIN [Training Records and Information Network]). Examples of acceptable written training documents include 40-Hour OSHA HAZWOPER card, respirator authorization card, DOE certificate of core radiological training II card, medic/first aid training card, or a copy of an individual's or department's (BBWI personnel only) TRAIN system printout demonstrating completion of training. For subcontractor personnel, a copy of a certificate or card issued by the institution where the site-specific required training was received also is acceptable proof of training. The DOE radiological worker training must be documented and the INEEL site-specific training designator must be stamped or written on the card.

4.2 Site-Specific Project Training

Before work at the task site begins, the FTL, HSO, or designee will conduct site-specific HASP training consisting of a complete review of a controlled copy of the project HASP and attachments, applicable JSAs, SWPs (if required) technical procedures (TPRs), and other applicable work control and authorization documents. Time for discussion and questions will be included in the training. Site-specific training can be conducted in conjunction with or separately from the required formal pre-job briefing (MCP-3003).

At the time of site-specific HASP training, personnel training records will be checked and verified to be current and complete for all required training shown in Table 4-1. After the FTL, HSO, or designee has completed site-specific training, personnel will sign a Form 361.47 or equivalent indicating that they have received this training, understand the project tasks and associated hazards and mitigation, and agree to follow all applicable work control and safety requirements. (Form 361.47 or equivalent training forms are available on the INEEL Intranet under "Forms.")

The FTL or HSO will monitor each 24-hour or 40-hour newly trained worker's performance to meet the required 1 day (for 24-hour training) or 3 days (for 40-hour training) of supervised field experience in accordance with 29 CFR 1910.120(e)/29 CFR 1926.65(e). Supervised field experience is required if a worker has not previously completed the training (documented) at another CERCLA site or if the worker is upgrading from 24-hour to 40-hour HAZWOPER training. A copy of the training documentation must be kept at the project site or must be available electronically.

Within 5 days of training completion, including the supervised field experience, a Form 361.47 or equivalent must be completed and sent to the ER training coordinator for inclusion in the TRAIN system.

Table 4-1. Required site-specific project training for Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS.

Training	FTL & HSO	Other Field Team Members	Nonfield Team Members ^a and Visitors Requiring Access beyond the SZ	SZ Access Only
40-hr HAZWOPER ^b	Y	Y	Y ^c	
24-hr HAZWOPER			Y ^d	
8-hr HAZWOPER Refresher (as applicable)	Y	Y	Y	
HAZWOPER Supervisor	Y			
Site-Specific HASP Training ^e	Y	Y	Y ^f	Y ^f
RW II – INEEL site-specific (except RCTs)	Y	Y	Y ^g	
Fire Extinguisher (000TRN232 or QLFWATCH)	Y			
CPR/Medic First Aid	Y			
Respirator Training ^h	Y	Y		
HAZMAT Employee General Awareness		Samplers only		
Area Warden and ECC Technical Support Training	FTL			
INTEC Access Training (as required by INTEC)	Y	Y	Y	Y
- Shaded fields indicate specific training is not required				

- a. Nonfield team members typically include equipment operators, laborers, and mechanics. Training is dependent upon the area to be accessed.
- b. 40-hr HAZWOPER required training will also include an additional 24 hours of HAZWOPER supervised field experience as required by 29 CFR 1910.120(e). This field experience, for this project, will be documented on Form 361.47 or equivalent.
- c. Minimum requirements for EZ access (HSO approval also required).
- d. Minimum requirements for access beyond SZ but not into EZ (HSO approval also required).
- e. Includes project-specific HAZCOM, site-access/security, decontamination, and emergency response actions as required by 29 CFR 1910.120(e).
- f. Or hazard briefing if accessing beyond the SZ during downtime or nonhigh-hazard activities (as defined in Section 2.9)
- g. Or must be escorted in the RBA. No access will be allowed in established CA without RWII training and RADCON approval.
- h. Full-face air purifying respirators to be worn only if airborne contaminant levels exceed the action limits (Table 9-1)
- CA = contamination area, ECC = emergency control center, EZ = exclusion zone, RBA = radiation buffer area, SZ = support zone.

4.3 Daily Plan of the Day Briefing and Lessons Learned

The FTL or designee will conduct a daily POD meeting, with other field team members contributing (including the HSO and the RCT, as applicable). During this meeting, daily tasks are to be outlined, hazards identified, hazard controls or mitigation and work zones reviewed, PPE requirements discussed, and employees' questions answered. At the completion of this meeting, any new work control documents will be read and signed (e.g., SWPs, RWPs, JSAs). Lessons learned from the previous day's activities will be particularly emphasized, as will completing tasks in the safest, most efficient manner. All personnel will be asked to contribute ideas to enhance worker safety and mitigate potential exposures at the project site. The POD meeting will be conducted as an informal meeting, and the only required record will be to document the completion of the POD meeting in the FTL logbook.

5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

BBWI site personnel will participate in the INEEL OMP as required by DOE Order 5480.8a and OSHA, 29 CFR 1910.120–1926.65. Medical surveillance examinations will be provided (1) before assignment, (2) annually, and (3) after termination of hazardous waste site duties or employment. This requirement includes personnel who are or may be exposed to hazardous substances at or above the OSHA permissible exposure limit (PEL) or published exposure limits, without regard to respirator use, for 30 or more days per year. Personnel who wear a respirator in performance of their job, or who are required to take respirator training to perform their duties under this plan, must participate in the medical evaluation program for respirator use at least annually, as required by 29 CFR 1910.134.

If requested, the PM will make available to an OMP physician (and subcontractor physicians) conducting medical surveillance for employees participating in this project a single copy of the HASP for the Phase I INTEC injection well drilling and sampling project for the OU 3-14 RI/FS, job hazard analysis, required PPE, confined space entry (as applicable), and other exposure-related information. Exposure monitoring results and hazard information furnished to the OMP physician must be supplemented or updated annually as long as the employee is required to maintain a hazardous waste/hazardous material employee medical clearance.

Before any employee begins work on the project, the PM will ensure that an employee job function evaluation form (Form 340.02) is validated by the project IH and submitted to OMP for review. Employees will not be permitted to work on the project until the OMP has sent a medical clearance to management or the IH has validated that there is no potential for exposure above the established action levels and that no additional substance-specific medical evaluations are required.

The OMP physician will evaluate the physical ability of an employee to perform the work assigned, as identified in the site HASP or other job-related documentation. A documented medical clearance (physician's written opinion) will be provided to the employee and line management stating whether the employee has any detected medical condition that would place him or her at increased risk of material impairment of his or her health from work in hazardous waste operations, emergency response, respirator use, and confined space entry (as applicable). The physician may impose restrictions on the employee by limiting the amount or type of work performed. The OMP responsibilities relative to personnel assigned to hazardous waste site activities include but are not limited to:

- Providing current comprehensive medical examinations (as determined by the examining physician) at an INEEL medical facility for full-time personnel
- Obtaining records and reports from employee's private physicians, as required by the OMP director
- Medically evaluating return-to-work cases following an absence exceeding 40 consecutive work hours if the absence resulted from illness or injury
- Medically evaluating an employee if management questions the ability of an employee to work or if an employee questions his or her own ability to work.

The attending physician will evaluate all information provided, including medical questionnaires, physical exam findings, blood chemistry and urinalysis results, pre-existing medical conditions, nature of the work, actual and potential hazards and exposures, and other factors deemed appropriate by the physician for determining the following for each employee:

- Ability to perform relevant occupational tasks
- Ability to use respiratory protection
- Ability to work in other PPE and heat/cold stress environments
- Requirement for entry into substance-specific medical surveillance programs.

If the OMP does not have sufficient information to complete a medical evaluation before respirator training, the employee's supervisor will be notified. The employee will not be permitted to undergo fit-testing until the needed information is provided and any additional examination or testing is completed.

5.1 Subcontractor Workers

Subcontractor project personnel will participate in a subcontractor medical surveillance program that satisfies the requirements of OSHA, 29 CFR 1910.120–1926.65. This program must make available medical examinations (1) before assignment, (2) annually, and (3) after termination of hazardous waste duties. The physician's written opinion will serve as documentation that subcontractor personnel are fit for duty.

The BBWI OMP physicians may request medical data from the subcontractor employee's private physician. Such data must be available before the employee can receive a hazardous material worker qualification. A subcontractor employee's past radiation exposure history must be submitted to the BBWI radiation dosimetry and records section, in accordance with the BBWI *Radiation Protection Manual*, MCP-188, "Issuance of Thermoluminescent Dosimeters and Obtaining Employees Dose History," and MCP-2381, "Employees Exposure Questionnaire," of the BBWI *Radiation Protection Manual*.

5.2 Injuries on the Site

It is policy that a BBWI OMP physician examine all injured personnel if an employee is injured on the job, if an employee is experiencing signs and symptoms consistent with exposure to a hazardous material, or if there is reason to believe that an employee has been exposed to toxic substances or physical or radiological agents in excess of allowable limits.

In the event of a known or suspected injury or illness resulting from exposure to a hazardous substance, or physical or radiological agent, the employee will be transported to the nearest INEEL medical facility (INTEC-637) for evaluation and treatment, as necessary. Subcontractor employees will be taken to the closest INEEL medical facility to have an injury stabilized or occupational exposure evaluated before transport to the subcontractor's treating physician or offsite medical facility.

The HSO is responsible for obtaining as much of the following information as is available to accompany the individual to the medical facility:

- Name, job title, work (site) location, and supervisor's name and phone number
- All substances and physical or radiological agents the individual was exposed to (known or suspected); material safety data sheet (MSDS), if available
- Nature of the incident, injury, or exposure and related signs or symptoms of exposure

- First aid or other measures taken
- Locations, dates, and results of any airborne exposure monitoring and sampling
- PPE in use during this work (for example, type of respirator and cartridge used).

The treating or examining physician will medically evaluate the employee according to the signs and symptoms observed, hazard involved, exposure level, and specific medical surveillance requirements established by the OMP director, in compliance with 29 CFR 1910.120/1926.65.

The INTEC shift supervisor (SS) will be contacted if any injury or illness occurs at an INTEC project site. As soon as possible after an injured employee has been transported to the medical facility, the FTL or designee will make notifications as indicated in Section 11 of this HASP.

The RADCON personnel will evaluate all actual or suspected abnormal radiological exposures in excess of allowable limits, and will establish the follow-up actions. For internal uptakes (calculated as committed effective dose equivalent values), INEEL Engineering Design File (EDF)-INEL003, "Established Levels of Radionuclide Intake for Consideration of Medical Intervention," will be used as the basis for this evaluation and follow-up actions.

All wounds will be examined by an OMP physician to determine the nature and extent of the injury. The physician will determine if the wound can be bandaged adequately for entry into a radiological contamination area, in accordance with Article 542 of the BBWI *Radiological Protection Manual*.

5.3 Substance-Specific Medical Surveillance

Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS will be conducted in areas outside the tank farm; however, the potential exists for encountering contaminated soil and environmental media from sampling the injection well. Groundwater or sludge sampling and grout mixing (crystalline silica) are the tasks most likely to generate airborne contaminants. Monitoring will focus on these activities to ensure that controls and work practices minimize contaminant migration. Based on the nature of the matrix of the materials being sampled, established sampling methods, low concentrations of contaminants in the environmental media, and PPE to be worn, there is a low potential for personnel conducting sampling tasks to be exposed at concentrations above the action limits (and if so, only for a short duration). **Based on this low exposure potential, additional regulatory mandated substance-specific medical surveillance does not apply.** If additional COPCs are identified during remedial tasks or if controls do not mitigate exposures below established action levels, additional sampling will be done to quantify exposures to determine if an OSHA substance-specific standard applies.

6. ACCIDENT PREVENTION PROGRAM

The Phase I INTEC injection well drilling and sampling project for the OU 3-14 RI/FS presents potential chemical, radiological, and physical hazards to personnel. It is important that all personnel understand and follow the site-specific requirements described in this HASP. Engineering controls, hazard isolation, specialized work practices, and the use of PPE will all be implemented to eliminate or mitigate all potential hazards and exposures. However, every person on the site is responsible for the identification and control of hazards.

6.1 Voluntary Protection Program and Integrated Safety Management System

BBWI's safety processes embrace the VPP and ISMS criteria, principles, and concepts as part of operational excellence. All levels of management are responsible for implementing safety policies and programs and for maintaining a safe and healthful work environment. Project personnel are expected to take a proactive role in preventing accidents, ensuring safe working conditions for themselves and fellow personnel, and complying with all work control documents and procedures.

ISMS focuses on the system; VPP focuses on the people. Both have processes for defining work scope, identifying, analyzing, and mitigating the hazards. VPP is a process that promotes and encourages continuous safety improvement but is not a requirement of any regulatory agency. BBWI and affected subcontractors participate in VPP and ISMS for the safety of their employees. Additional information regarding the BBWI VPP and ISMS programs can be found in PDD-1005, "Site Operations." The five key elements of VPP and ISMS are:

VPP

Management leadership

Employee involvement

Work site analysis

Hazard prevention and control

Safety and health training

ISMS

Define work scope

Analyze hazards

Develop/implement controls

Perform work within controls

Provide feedback/improvement

6.2 General Safe-Work Practices

The following practices are mandatory for all BBWI and subcontractor personnel performing Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS. All site visitors entering the site area (SZ and beyond) must follow these practices. Failure to follow these practices may result in permanent removal from the site and other disciplinary actions. The PM, FTL, and HSO are responsible for ensuring these hazard control practices are followed at the site:

- Project personnel will limit site access to authorized BBWI, subcontractor, and authorized visitor personnel only

- Project personnel have the authority to initiate STOP WORK actions, using BBWI *Safety and Health Manual*, MCP-553, “Stop Work/Shut Down Action”
- Project personnel will not eat, drink, chew gum or tobacco, smoke, apply cosmetics or sunscreen, or perform any other practice that increases the probability of hand-to-mouth transfer and ingestion of materials, except within designated areas
- Project personnel will be aware of and comply with all safety signs, color codes, and barriers. Project personnel will adhere to BBWI *Safety and Health Manual* 14A, MCP-2714, “Safety Signs, Color Codes, and Barriers.”
- Project personnel will be alert for dangerous situations, strong or irritating odors, airborne dust or vapor, and radiation dosimetry alarms. Project personnel will report all potentially dangerous situations to the FTL, the HSO, or both (report dosimetry alarms to others in the work area and then the RCT).
- Project personnel will avoid direct contact with potentially contaminated soil or other substances. Project personnel will not walk through spills or other areas of contamination, and will avoid kneeling, leaning, or sitting on equipment or surfaces that may be contaminated.
- Project personnel will be familiar with the physical characteristics of the site, including, but not limited to the following:
 - Wind direction
 - Accessibility of fellow personnel, equipment, and vehicles
 - Communications at the site and with nearby facilities
 - Areas of known or suspected contamination and postings
 - Major roads and means of access to and from the site
 - Nearest water sources and fire fighting equipment
 - Warning devices and alarms
 - Capabilities and location of nearest emergency assistance.
- Project personnel will report all broken skin or open wounds to the HSO or FTL. A BBWI OMP physician will determine whether the wound presents a significant risk of internal chemical or radiological exposure. The OMP physician will consider how the wound can be bandaged, and will recommend PPE to be worn by the injured employee. Personnel with unprotected wounds will not be permitted to enter chemical or radiological contaminated areas or handle contaminated or potentially contaminated materials at the site without having been examined by a BBWI OMP physician.
- Project personnel will prevent releases of hazardous materials, including those used at the site. If a spill occurs, personnel must try to isolate the source (if this is possible and does not create a greater exposure potential), then leave the area in an upwind direction and report it to the FTL, HSO, or both. The INTEC SS will be notified and additional actions will be

taken, as described in Section 11. Appropriate spill response kits or other containment and absorbent materials will be maintained at the site.

- Project personnel will avoid unnecessary and excessive movement during doffing of anticontamination (anti-C) clothing
- Project personnel will ensure that electrical equipment, wiring, cables, switches, and current overload protection meet applicable regulations and are maintained in a manner that protects project personnel from shock hazards and injury and prevents property damage. Ground-fault protection will be provided if electrical equipment is used outdoors.
- Project personnel will keep all ignition sources at least 15 m (50 ft) from explosive or flammable environments and use nonsparking, explosion-proof equipment, if advised to do so by an SE.
- Project personnel working in the exclusion zone (EZ) will implement the “buddy system” (see Section 6.5 of this HASP)
- Project personnel will proceed directly to a personal contamination monitor after surveying for contamination at the established radiological contamination area exit point and will take care not to touch the face, mouth, and eyes before a survey.
- Project personnel who wear contact lenses will comply with the BBWI *Safety and Health Manual* 14A and MCP-2716, “Personal Protective Equipment.”

6.3 ALARA Principles

All ALARA principles will be followed during all drilling and sampling activities. Section 8, Hazard Assessment, identifies and describes potential chemical, radiological, and physical hazards that may be encountered in these activities. Radiological contaminant monitoring will be as described in Section 8.3.

Radiation exposure to project personnel will be controlled such that radiation exposures are well below regulatory limits, and there is no radiation exposure without commensurate benefit. Unplanned and preventable exposures or uptakes are considered unacceptable. All project tasks will be evaluated with the goal of eliminating or minimizing personnel radiation exposure and contamination. It is the responsibility of all project personnel to follow ALARA principles and practices. All personnel conducting drilling and sampling tasks must strive to keep both external and internal radiation doses ALARA by adopting the practices described in the following subsections.

6.3.1 External Radiation Dose Reduction

Although the aquifer wells will be drilled outside the tank farm, leaks from the CPP-28 and CPP-31 locations could have contaminated the soil below 10 to 20 ft (3 to 6 m) bls. The potentially contaminated soil is the greatest potential source of external radiation exposure. Contaminated soil may be encountered in the form of samples or drill cuttings while penetrating in or below the 10 to 20 ft (3 to 6 m) bls interval. Radiological and IH monitoring will focus on these depths. As the wells are drilled, the RCT will survey the soil cuttings and injection well samples for contamination.

Basic protective measures used to reduce external doses include (1) minimizing time in radiation areas, (2) maximizing the distance from known sources of radiation, and (3) using shielding (as

applicable). A task-specific RWP will be written by INTEC RADCON for drilling and sampling activities as required by MCP-7, "Radiological Work Permit." The RWP will define hold points, posting requirements, required dosimetry, RCT coverage, radiological control areas, and radiological limiting conditions. All personnel will be required to read and acknowledge the RWP requirements as well as attend the mandatory pre-job briefing prior to being allowed to sign the RWP (or scan the bar code) and receive electronic dosimetry.

6.3.2 Internal Radiation Dose Reduction

As described in Section 8, radionuclides have been identified from previous sampling of the WAG 3 OU 3-14 injection well (ite CPP-23).). Drilling and sampling tasks will present the greatest potential for internal uptake. Hand-held instruments will be used to monitor for contamination during these tasks. Monitoring will be done in accordance with MCP-357, "Job-Specific Air Sampling/Monitoring," and as deemed appropriate by INTEC RADCON personnel.

An internal dose may result from radioactive material being taken into the body. Radioactive material can enter the body through inhalation, ingestion, absorption through wounds, or injection from a puncture wound. Reducing the potential for radioactive material to enter the body is critical to avoiding an internal dose. Potential internal uptakes during Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS will be minimized by planning sampling tasks, using drilling diversion lines and cyclone for materials being forced to the surface, using standardized sampling procedures and controls, and using protective clothing and respiratory protection (as the final control measure).

6.4 Nonradiological Contaminant Exposure Avoidance

The WAG 3 OU 3-14 injection well (site CPP-23) is known to have received mercury in the form of mercuric nitrate solution ($1.99 \text{ E-}04 \text{ mg/L}$). Additionally, arsenic ($7.13 \text{ E-}03 \text{ mg/L}$) and chromium ($1.05 \text{ E-}02$) have also been detected. These nonradiological constituents may be encountered during well installation and sampling activities. Potential worker exposure will be limited to contact with environmental media (water, sludge, fluidized drill material). Section 8 discusses in detail the injection well nonradiological contaminants. In addition, QA equipment rinsate samples may be collected and preserved with concentrated acid to lower the pH to less than 2. Protective clothing and careful transfer of acid to sample containers will mitigate the potential acid contact hazard. Monitoring nonradiological contaminants is described in Section 8.3.

Nonradionuclide contaminants and radiological constituents have the same exposure pathways. Each contaminant has distinct physical, chemical, and mechanical properties that determine its toxicity. Threshold limit values (TLVs) have been established to provide guidelines in evaluating airborne and skin exposure to these chemicals and materials. They represent levels and conditions under which it is believed that nearly all workers may be exposed day after day without adverse health effects. Based on these TLVs, more conservative specific action limits have been established to further limit the potential for approaching these contaminant TLVs.

Every effort will be made to isolate the source of radionuclide and nonradiological hazards through engineering controls and barriers (e.g., plastic sheeting) where feasible. Some of these contaminants may pose other exposure hazards from contact and skin absorption, and avoidance practices will minimize the exposure potential. Some methods of avoiding exposure during sampling tasks include the following:

- Isolating known sources of contamination through the use of engineering controls or barriers
- Wearing all required PPE, inspecting all pieces before donning, taping all seams

- If contamination is encountered, changing gloves frequently to prevent the spread of contamination
- Changing protective clothing if it becomes damaged or soiled with soil material
- Minimizing time in known or suspected contamination areas
- If additional outer protective clothing is required, doffing PPE following radiological protocols
- Washing hands, face, and other exposed skin before eating, drinking, smoking, or other activity that may provide a pathway for contaminants.

6.5 The Buddy System

The two-person buddy system will be used at the site when project personnel have entered the established EZ. The buddy system requires workers to assess and monitor their buddy's mental and physical well-being during the work day. A buddy must be able to:

- Provide assistance
- Verify the integrity of PPE (when required)
- Observe a buddy for signs and symptoms of heat stress, cold stress, or contaminant exposure
- Notify other personnel in the EZ if emergency assistance is needed.

The FTL will ensure that a buddy is assigned for each worker prior to entry into the EZ. Workers must be able to see or hear and effectively communicate with their buddy at all times when in the EZ. Workers will continually check their buddy while working in the EZ.

7. SITE CONTROL AND SECURITY

Based on the nature of the Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS, HAZWOPER-defined work zones will be established. Additional radiological control areas will be established based on radionuclides in the soil being sampled. Entry into and exit out of site work zones will be controlled through the appropriate use of barriers, signs, and other measures that are described in detail in this section and in accordance with BBWI *Safety and Health Manual* (MCP-2714). Personnel not directly involved with sampling activities will be excluded from entering work zones. Nonfield team members, such as inspectors, may be authorized to enter established controlled work zones to conduct official business if they are authorized by the HSO and have met all the site-specific training requirements for the area they have a demonstrated need to access (as listed on Table 1 of this HASP and as posted). To minimize safety or health hazards or as an ALARA consideration, visitors may not be allowed beyond the SZ during certain project tasks. The HSO, in conjunction with INTEC RADCON personnel, will determine any visitor's need for access beyond the SZ.

Figures 7-1 and 7-2 illustrate the work zones that will be established for the injection well borehole and the two groundwater monitoring wells that will be installed during the drilling and sampling tasks. These figures represent the general configuration of the work zones and are not intended to provide an exact layout, position of all equipment, or zone sizes. All zones illustrated will be established. However, changing field conditions may warrant reconfiguring the layout, size, and orientation of these controlled areas. Changes in zone configuration and size will be the decision of the HSO, in conjunction with the IH, RCT, and FTL, based on the IH exposure assessment, site characterization, and RADCON radiological evaluations.

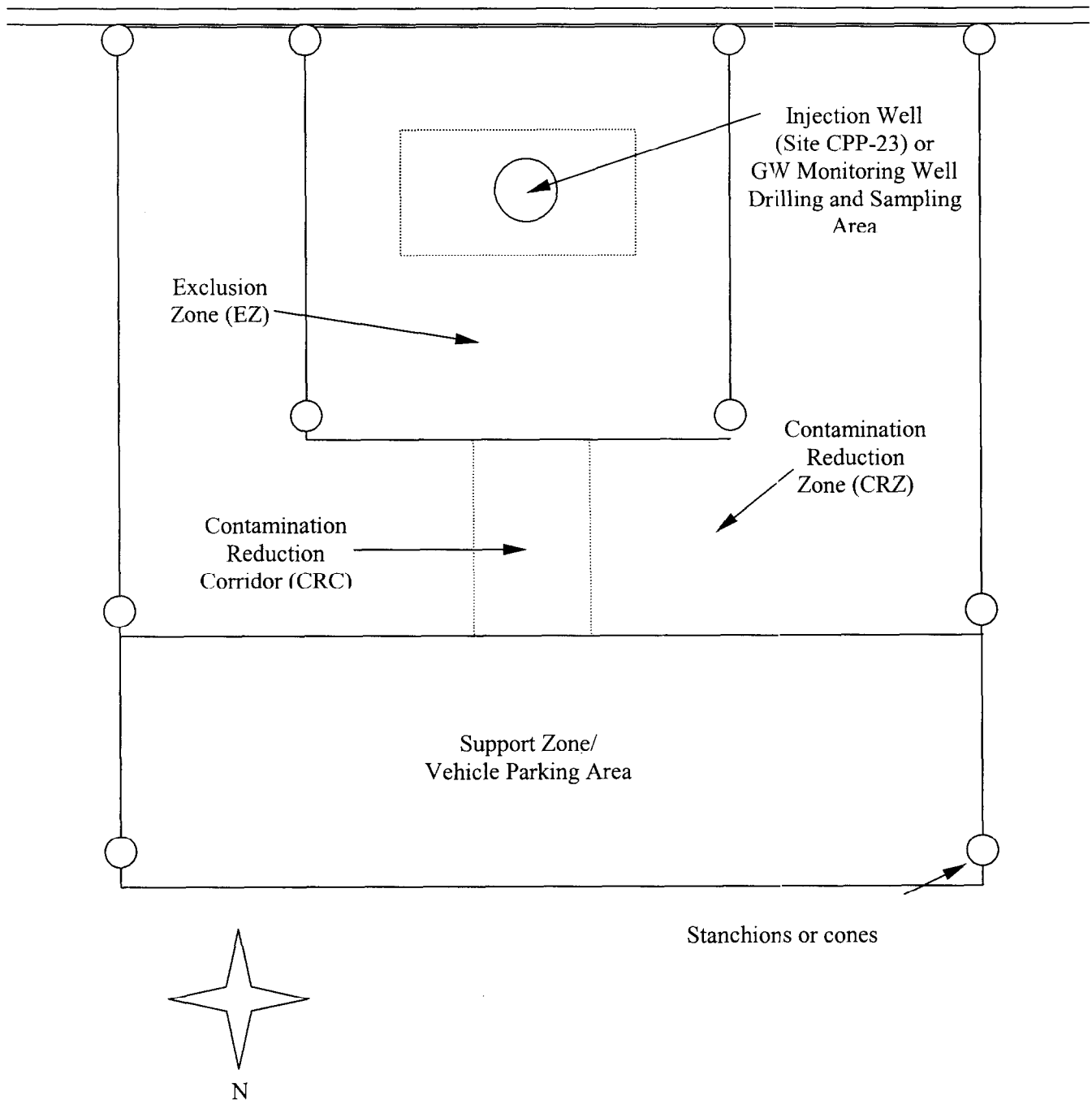
Potential radiological and nonradiological hazards (including industrial safety hazards) will both be evaluated when delineating the initial zone locations and size. Common barriers may be used to delineate both radiological and nonradiological work-zone postings, depending on the nature and extent of contamination. If common barriers are used, they will be posted according to both sets of requirements (29 CFR 1910.120 and 10 CFR 835) using appropriate colored rope and postings. These zones may change in size and location as project tasks evolve, based on site monitoring data, and as wind direction changes. Additionally, entrances and exits may change based on these same factors. HAZWOPER work zones will include the following:

- Exclusion zone (EZ)
- Contamination reduction zone (CRZ), including a contamination reduction corridor (CRC)
- Support zone (SZ).

The EZ, CRZ, and SZ will be based on site characterization and radiological evaluations. The SE, the IH, and RADCON personnel will help the HSO establish the EZ, the CRZ, and the SZ.

Radiological control areas, required for the drilling and sampling tasks, will be established by INTEC RADCON personnel, in accordance with the BBWI *Radiation Protection Manual*, MCP-187, "Posting Radiological Control Areas."

Building CPP-666



-- Not to Scale --

Figure 7-1. General configuration for HAZWOPER controlled work zones (EZ, CRZ, and SZ) for the injection well (site CPP-23) borehole and the groundwater monitoring wells located adjacent to the injection well.

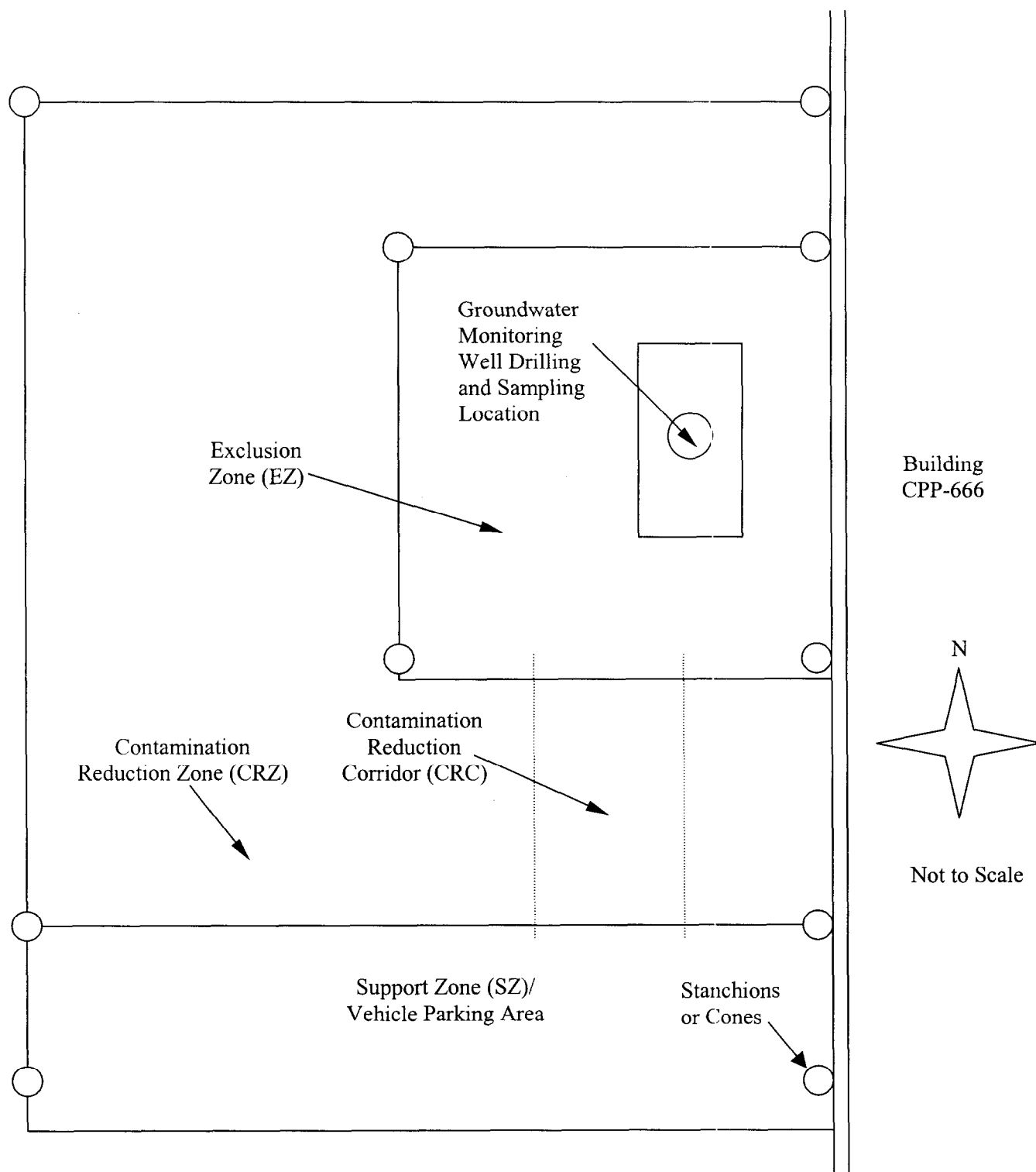


Figure 7-2. General configuration for HAZWOPER controlled work zones (EZ, CRZ, and SZ) for the groundwater monitoring well located downgradient of the INTEC injection well.

7.1 Exclusion Zone

The EZ will be large enough to encompass the sampling area. The minimum number of personnel required to safely perform the project tasks will be allowed into the EZ. The EZ is a controlled access zone at all times. An entry and exit point will be established at the periphery of the EZ/CRC to regulate the flow of personnel and equipment. The EZ boundary will be delineated with rope or printed hazard ribbon. All personnel who enter the EZ will wear the appropriate level of PPE for the degree and type of hazards, as listed in Section 9.

Factors that will be considered when establishing the EZ boundary include air monitoring data, radionuclide-contamination data, radiation fields, equipment in use, the physical area necessary to conduct site operations, and the potential for soil contaminants to migrate from the area. The boundary may be expanded or contracted, as this information becomes available.

If radiological contamination becomes a concern, sampling tools or equipment will not be released from the established radiological contaminated area until a comprehensive radiological survey has been completed (using hand-held instruments, swipes, and similar techniques), in accordance with MCP-425, "Surveys of Materials for Unrestricted Release and Control of Movement of Contaminated Material." Any contaminated and potentially contaminated PPE will be decontaminated (Section 10) or containerized and stored in the area of contamination until fully characterized. All items (including PPE, equipment, and debris) generated during any decontamination process will be characterized as described in Section 10 and the *Field Sampling Plan for the Characterization of Waste Area Group 3, Operable Unit 3-14, Injection Well at the Idaho Nuclear Technology and Engineering Center*.

7.2 Contamination Reduction Zone and Corridor

The project CRZ and CRC are transition areas surrounding the EZ, and are located between the EZ and SZ (Figures 7-1 and 7-2). The CRZ and CRC will buffer and further reduce the probability of the SZ becoming contaminated. All project personnel and equipment entering and exiting the EZ will transition through the CRC. The size and location of the CRC will change frequently and changes will be communicated to field team members. The CRC boundaries will not be formally delineated.

A radiological contamination area will be established for the sampling area, and RADCON personnel will survey all equipment and materials to ensure free release criteria are met before equipment and materials are released. If radionuclide or mixed contamination (nonradiological/radiological) is found, then radionuclide decontamination techniques will initially be used, as described in Section 10. If radiological contamination or radiation is detected at levels greater than the RWP limiting conditions, then work will stop and a new RWP will be written.

Before leaving the work area, project personnel will follow posted and RCT instructions for personal contamination surveys.

The project IH will be responsible for nonradionuclide contamination issues, and will determine the most appropriate decontamination methods, as described in Section 10. A designated portion of the CRC will be established for the nonradionuclide decontamination of equipment (if required). All decontamination supplies (e.g., nonradionuclide decontamination solution and Teri wipes), used nonradiological PPE, and debris waste containers may be located in the CRC.

7.3 Support Zone

The SZ will be considered a “contamination-free” area. The SZ will be located near the sampling area in the prevailing upwind direction of the EZ (where possible) and will be readily accessible to the nearest road (where practical). The SZ is a controlled area outside the CRZ, and will be delineated using stanchions, cones, existing fence, or equivalent material to prevent nonfield team personnel from entering the area or inadvertently entering a more restrictive work zone (e.g., CRZ or EZ).

Support facilities (e.g., vehicle parking, additional emergency equipment, extra PPE, and stored monitoring and sampling equipment) may all be located in the SZ. Visitors who do not have appropriate training and have not received site-specific training will be restricted to the SZ.

The project site work zones and radiological control areas will be maintained during off-hours and weekends. These zones and areas will remain intact until all site tasks have been completed and equipment and supplies have been decontaminated and removed from the project site. The HSO and RCT will ensure that site zones are posted and intact and will be responsible for breaking down the zones when site activities have been completed.

In accordance with the INEEL *Radiation Protection Manual* and MCP-187, “Posting Radiological Control Areas,” only RADCON personnel can post and remove RADCON postings.

7.4 Designated Eating and Smoking Area

Ingestion of hazardous substances is likely when workers do not practice good personal hygiene. It is important to wash hands, face, and other exposed skin thoroughly after completion of work and before smoking, eating, drinking, and chewing gum or tobacco. **Smoking, chewing, eating, applying lip balm, and drinking are not allowed within the site work zones.**

All personnel who entered the radiological contamination area **must** complete, at a minimum, a whole body survey (frisk) in accordance with the posted instructions **prior** to using established eating or smoking areas. All personnel will wash their hands (wash hands at a minimum; washing the face and other exposed skin is recommended) prior to using designated eating or smoking areas. The designated eating areas for the site personnel will be the INTEC established eating or smoking areas, or will be established by the IH/RCT personnel. All INTEC smoking policies will be complied with, including disposing of smoking materials in the proper receptacle.

8. HAZARD ASSESSMENT

The overall objectives of this hazard assessment section are to provide guidance on the following:

- Evaluating all sampling tasks to determine the extent that existing radiological, chemical, and physical hazards may potentially affect site personnel by all routes of entry
- Establishing the necessary monitoring and sampling required to validate exposure and contamination levels, determine adequate action levels to mitigate potential exposures, and provide specific actions to be followed if action levels are reached
- Determining engineering controls, isolation methods for contaminated materials, work practices to limit personnel exposure, administrative controls, and appropriate respiratory protection and protective clothing to protect site personnel from site hazards.

This HASP has been developed in accordance with MCP-255 and follows the hazard identification, evaluation, and mitigation process found in PRD-25, “Activity Level Hazard Identification, Analysis, and Control.”

8.1 Identification of Potential Exposure Hazards

Personnel may potentially be exposed to safety hazards and chemical, radiological, and physical agents during Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS. The potential hazards to personnel entering the work zones are dependent on both the chemical/radiological nature of the encountered contaminants and the specific task. Engineering controls will be implemented whenever possible, along with work practice controls (administrative), real-time monitoring of contaminants, and site-specific hazard training to further mitigate potential exposures and hazards. Formal pre-planning (job walk-down and completion of the pre-job briefing checklist), JSA, and other work control permits will be written based on the hazards identified in this HASP and site-specific conditions. Collectively, this documentation and training will be used to identify and mitigate potential hazards and provide feedback for lesson learned during previous sampling tasks.

Tables in this section identify the potential chemical, radiological, and physical hazards that may be encountered during well drilling and sampling tasks, as well as monitoring methods, action limits, and other hazard-specific mitigation measures. These radiological and nonradiological contaminants represent the primary health hazards to personnel during drilling and sampling operations and are not intended to represent all contaminants of potential concern identified in the Phase I FSP (DOE-ID 2000b). The tables in this section include

- Table 8-1—maximum radiological contaminant concentrations detected in samples previously collected from the WAG 3 OU 3-14 injection well (site CPP-23)
- Table 8-2—maximum nonradiological contaminant concentrations detected in samples previously collected from the WAG 3 OU 3-14 injection well (site CPP-23)
- Table 8-3—evaluation of radiological and nonradiological contaminants detected in samples previously collected from the WAG 3 OU 3-14 injection well (site CPP-23) with respect to potential routes of exposure, symptoms of overexposure, and qualitative exposure risk potential based on the nature of the contamination, work tasks, and source term (concentration)

- Table 8-4—summary of each primary project task, associated hazards, and mitigation
- Table 8-5—Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling hazards (radiological and nonradiological) to be monitored by the IH and RADCON personnel
- Table 8-6—equipment available for monitoring radiological and nonradiological hazards
- Table 8-7—action levels and associated responses for specific sampling hazards.

Previous sampling of the WAG 3 OU 3-14 injection well (site CPP-23) quantified contaminant levels for soil sent for disposal. The samples are considered to be representative of the injection well. Radionuclides were detected in samples as listed in Table 8-1.

The primary nonradionuclide contaminant is mercury from mercuric nitrate solution discharged in 1981 (Table 8-2). Although arsenic and chromium have also been detected in previous aqueous samples, they represent a minimal potential exposure potential, based on the aqueous nature of their matrix. Based on the contaminants previously identified during sampling events (radionuclide and nonradiological), the primary personnel exposure hazards will be from contact with potentially contaminated environmental media being drilled and sampled and other contaminated soil intervals that may be encountered. Engineering controls, experienced drillers and samplers, administrative controls (limiting access to the area), worker personal protective clothing, personnel monitoring, and following all RWP requirements constitute the mitigation strategy to minimize personnel exposure to radiological and nonradiological contaminants.

JSAs and RWPs will be used in conjunction with this HASP to address hazardous and radiological conditions at the site.). These work control documents will augment this HASP and provide further details about specialized protective equipment and dosimetry requirements during sampling tasks.

8.2 Routes of Exposure

Exposure pathways for contaminants that may be encountered during drilling and sampling tasks are directly related to the nature of tasks, type of equipment used to drill and collect samples, and effectiveness of project controls (e.g., avoiding contact with contaminated material). Isolation methods (e.g., diversion cyclone), IH and RADCON monitoring, training, and work controls are all intended to mitigate potential exposures and uptake of contaminants. However, drillers, samplers, and support personnel could still be exposed to contaminants.

Exposure pathways include:

- Inhalation of contaminated soil, soil vapor, or fugitive dust. Inhalable vapor or respirable dust have a direct route of entry into the respiratory tract, which may result in passage into the bloodstream or respiratory tract deposition
- Skin absorption and contact with contaminated surfaces during drilling and sample handling tasks that can be absorbed through unprotected skin, resulting in potential absorption through the skin and/or skin contamination
- Ingestion of contaminated soil or materials adsorbed to dust particles or on surfaces resulting in potential uptake of contaminants through the gastrointestinal tract that may result in gastrointestinal irritation, internal tissue irradiation, and/or deposition to target organs

Table 8-1. Radiological contaminants of concern for personnel during injection well (site CPP-23) tasks^a.

Radionuclide	Average activity detected (pCi/g)	Maximum activity detected (pCi/g)
Am-241	5.40×10^{-1}	5.40×10^{-1}
Co-60	NA	NA
Cs-137	7.0×10^1	7.0×10^1
Eu-152	NA	3.8
Eu-154	NA	2.5
H-3	2.00×10^4	7.30×10^4
I-129	7.80×10^{-1}	1.20
Pu-238	5.0×10^{-1}	5.0×10^{-1}
Pu-239/240	5.5	5.5
Sr-90	4.06×10^4	3.2×10^5
Tc-99	8.96×10^1	7.36×10^2

a. Taken from the *Comprehensive RI/FS for the Idaho Chemical Processing Plan OU 3-13 at the INEEL*, DOE/ID-10572, November 1997.

- Injection while handling contaminated materials by breaking of the skin or migration through an existing wound, resulting in localized irritation, contamination, uptake of soluble contaminants, and deposition of insoluble contaminants.

8.3 Environmental and Personnel Monitoring

The greatest potential for drillers and samplers to be exposed to contaminants is from direct contact with contaminated soil, sludge, or other environmental media that may be encountered during project tasks. Refinement of work controls zones (Section 7), engineering and administrative controls, worker training, and use of protective equipment will mitigate most of these hazards.

RADCON and IH personnel will focus on activities with the highest potential for contact and monitor with direct reading instrumentation, collect swipes, and conduct full and partial period air sampling in accordance with applicable MCPs and other applicable guidelines. Monitoring with direct-reading instruments will be used to assess the effectiveness of these controls and work practices. Monitoring will be site-specific (each aquifer well and the injection well) with instrumentation listed on Table 8-6 selected on the basis of the contaminants associated with or suspected to be at each location. The RCT and IH will be

Table 8-2. Nonradiological contaminants of concern for personnel during injection well (site CPP-23) tasks^a.

Chemical or Compound	Average level detected (mg/L)	Maximum level detected (mg/L)
Arsenic	7.13 E-03	1.08 E-02
Chromium	1.05 E-02	3.88 E-02
Mercury	1.99 E-04	4.4 E-04

a. Taken from the *Comprehensive RI/FS for the Idaho Chemical Processing Plant OU 3-13 at the INEEL*, DOE/ID-10572, November 1997.

responsible for determining the best monitoring technique for radiological and nonradiological contaminants respectively. Other support personnel (e.g., equipment operators and drillers) and the general drilling and sampling areas may also be monitored to verify the integrity of engineering controls and to determine the effectiveness of contamination control and decontamination practices, if required.

Personnel working at the Phase I INTEC injection well drilling and sampling project site may be exposed to hazardous materials or hazardous physical agents. Safety hazards and other physical hazards will be monitored and controlled as outlined in Section 8.4. Specific hazardous agent exposures that will be monitored are listed in Table 8-5. The IH and radiological monitoring are outlined in Sections 8.3.1 and 8.3.2, respectively.

8.3.1 Industrial Hygiene Monitoring

Various direct-reading instruments and other semiquantitative detection tests may be used to determine the presence of nonradiological and other physical agents. The frequency and type of sampling and monitoring will be determined by changing site conditions, direct-reading instrument results, observation, and professional judgment. Instruments and sampling methods listed in Table 8-6 are available for use by the project IH.

Based on direct-reading instruments and changing site conditions, the IH may conduct full- and partial-period airborne contaminant sampling. All air sampling will be done using applicable NIOSH or OSHA methods and in conformance with the BBWI *Safety and Health Manual*. Risk assessments for site personnel will be conducted according to the BBWI *Safety and Health Manual*, MCP-153, "Industrial Hygiene Exposure Assessment."

8.3.1.1 Industrial Hygiene Instrument and Equipment Calibration. All monitoring instruments will be maintained and calibrated in accordance with the manufacturer's recommendations, existing IH protocol, and in conformance with the BBWI *Safety and Health Manual*. At a minimum, direct-reading instruments will be calibrated prior to daily use and more frequently as determined by the project IH. Calibration information, sampling and monitoring data, results from direct-reading instruments, and field observations will be recorded as stated in Section 3.

8.3.2 Radiological Monitoring

Radiological contamination could be encountered during drill cutting or from environmental sampling media and sampling equipment decontamination. This potential exposure includes external radiation (penetrating ionizing radiation [gamma and high-energy

Table 8-3. Evaluation of radiological and nonradiological contaminants previously identified in the WAG 3 OU 3-14 injection well (site CPP-23).

Material or Chemical (CAS #, Vapor Density, and Ionization Energy)	Exposure Limit ^a (PEL/TLV)	Routes of Exposure ^b	Indicators or Symptoms of Over- Exposure ^c (Acute and Chronic)	Target Organs/System	Carcinogen? (source) ^d	Exposure Potential ^e (all routes without regard to PPE)
Nonradiological Contaminants						
Arsenic (7440-38-2) VD: NA	TLV-0.01 mg/m ³ PEL – 0.01 mg/m ³ (29 CFR 1910.1018)	Ih, Ig, S, Con	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin	Liver, kidneys, skin, lungs, lymphatic system	A1 – ACGIH Yes—NTP Yes—IARC Yes—OSHA	Low Potential Average concentration of 7.13 E-03 mg/L in previous samples. Matrix is aqueous and presents little to no airborne potential and minor contact hazard.
Chromium (as dust) (7440-47-3) VD: NA	TLV—0.5 mg/m ³ (III) TLV—0.01mg/m ³ (VI) PEL—1 mg/m ³ (metal) PEL—0.5 mg/m ³ (III)	Ih, Ig, S, Con	Irritation of eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Chromium VI A1—ACGIH Yes—NTP Yes—IARC Yes—OSHA	Low Potential Average concentration of 1.05 E-02 mg/L in previous samples. Matrix is aqueous and presents little to no airborne potential and minor contact hazard.
Crystalline Silica (dust) (14464-46-1)	0. 05 mg/m ³ (respirable fraction)	Ih, Con	Pulmonary fibrosis, silicosis	Respiratory	No	Moderate-High Potential Mixing of silica sand/flour for well completion.
Diesel Fuel (8008-20-6) VD: >1	Not established	Ih, Ig, S, Con	Nervous system, eyes, respiratory, dermis, headache, skin irritation	Skin	No	Moderate Potential Will be used to refuel equipment.

Table 8-3. (continued)

Material or Chemical (CAS #, Vapor Density, and Ionization Energy)	Exposure Limit ^a (PEL/TLV)	Routes of Exposure ^b	Indicators or Symptoms of Over- Exposure ^c (Acute and Chronic)	Target Organs/System	Carcinogen? (source) ^d	Exposure Potential ^e (all routes without regard to PPE)
Mercury (vapor) (7439-97-6) VP: 0.0012 mmHg	TLV-TWA—0.025 mg/m ³ (as inorganic Hg)	Ih, Ing, S, Con	Extremely destructive to mucus membrane, upper respiratory tract, eyes, and skin. Burning sensation, coughing, wheezing, laryngitis, short breath, headache, nausea, vomiting.	CNS, neuropathy, vision, kidney, reproductive, gastrointestinal tract	A4 - ACGIH	Low Potential Average concentration of 1.99 E-04 mg/L in previous samples. Aqueous matrix will reduce vapor generation and minor contact hazard.
Nitrate (nitrogen anion)	None	None	None	None	No	No Potential Anion form of nitrogen
Nitric Acid 7697-37-2 IE – 11.95 eV	TLV—2 ppm STEL—4 ppm	Ih, Ig, Con	Irritation of eyes, skin, mucous membrane; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion	Eyes, skin, respiratory system, teeth	No	Low- Moderate Potential Used to preserve groundwater samples for metals analysis.
Sulfuric Acid 7664-93-9	TLV—1 ppm STEL—3 ppm	Ih, Ig, Con	Irritation of eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatitis; dental erosion; tracheobronchitis; eye, skin burns; dermatitis	Eyes, skin, respiratory system, teeth	A2-ACGIH (refers to sulfuric acid in strong acid mists)	Low -Moderate Potential Used to preserve groundwater samples for organic nitrogen analysis.

Radionuclides Detected— Am-241, Co-60, Cs-137, Eu-152, Eu-154, H-3, I-129, Pu-238, Pu-239, Pu-239/240, Sr-90, Tc-99 (“Comprehensive RI/FS for the Idaho Chemical Processing Plant OU 3-13 at the INEEL”, DOE/ID-10572, November 1997.)

Table 8-3. (continued)

Material or Chemical (CAS #, Vapor Density, and Ionization Energy)	Exposure Limit ^a (PEL/TLV)	Routes of Exposure ^b	Indicators or Symptoms of Over- Exposure ^c (Acute and Chronic)	Target Organs/System	Carcinogen? (source) ^d	Exposure Potential ^e (all routes without regard to PPE)
Radionuclides (whole body exposure)	INEEL—1.5 rem/yr, project ALARA dose, limit-per RWP Posting of radiation areas per INEEL RCM, Table 2-3	Whole Body	Alarming electronic dosimetry will be used to alert workers to increased gamma radiation fields. TLDs for whole body total effective dose equivalent (TEDE)	Blood forming cells, gastrointestinal tract, and rapidly dividing cells	Yes	Low Potential Primary exposure potential from contact with environmental media with radionuclide contamination.
Radionuclides (fixed and removable surface contamination)	Posting of CAs per INEEL RCM, Table 2-4, § 835.404.c, and § 835.603.f	Ig, Con	Portable contamination instruments, swipes, and personal contamination monitor. (see Table 8-6)	Gastrointestinal tract, ionization of internal tissue	Yes	Low-Moderate Potential Contact with contaminated environmental media from the injection well and soil that may be encountered during drilling . Contamination levels are not anticipated to exceed 100 times Table 2-2 values for specific radionuclides.

a. American Conference of Governmental Industrial Hygienists (ACGIH) 1999 TLV Booklet and OSHA, 29 CFR 1910, substance-specific standards.

b. (Ih) inhalation; (Ig) ingestion; (S) skin absorption; (Con) contact hazard.

c. (nervous system) dizziness/nausea/lightheadedness; (dermis) rashes/itching/redness; (respiratory) respiratory effects; (eyes) tearing/irritation;

d. If yes, identify agency and appropriate designation (ACGIH A1 or A2; NIOSH; OSHA; IARC; NTP).

e. Estimates (\sim) of specific compounds from Tables 3 and 4.

CNS = central nervous system

CVS = cardiovascular system

DAC = derived air concentration

IE = ionization energy

eV = electron volts

PEL = permissible exposure limit

ppb = parts per billion

RCM = *R*adiological *C*ontrol *M*anual

REM = roentgen equivalent man

STEL = short-term exposure limit

TEDE = total effective dose equivalent

TLV = threshold limit value

VD = vapor density (Air = 1)

TLD = thermoluminescent dosimeter

Material Safety Data Sheets (MSDSs) for these chemicals are available at the project site.

Table 8-4. Phase I INTEC injection well drilling and sampling tasks, associated hazards, and mitigation.

Task(s)	Potential Hazard or Hazardous Agent	Hazard Elimination, Isolation or Mitigation
<ul style="list-style-type: none"> • Site preparation/equipment mobilization • Core drilling • Installing/completing wells • Sampling wells • Sample preservation • Sampling equipment/drill rig decontamination (if required) 	1. <u>Radiological contamination</u> —potential contact with radionuclides during drilling and sampling activities and decontamination tasks.	1. Controlled work areas, RWP, RCT surveys with dosimetry, direct-reading instruments, and PPE (as required).
	2. <u>Nonradiological contaminants</u> —fuels, lubricants, paint, potential contact with contaminated environmental media during drilling and sampling activities, decontamination tasks, and acids (sample preservation only).	2. MSDS for all chemicals used, controlled work areas, IH monitoring with direct-reading instruments, and PPE (as required).
	3. <u>Pinch points/caught-between/struck-by</u> —drill rig operations, sampling, drill vehicle/equipment movement, and material handling.	3. Experienced drillers/helpers, samplers, qualified equipment operators, spotter, backup alarms, controlled work areas; SWP (as required); hand, head, and body protection.
	4. <u>Lifting/backstrain</u> —handling sample coolers, moving drill steel, core/sample handling, moving/handling/ mixing bags of bentonite or silica sand.	4. Drill steel rack/tray/storage vehicle, mechanical lifting/movement/mixing devices, proper lifting techniques, two-person lifts (as required).
	5. <u>Heat/cold stress</u> —outdoor work, temperature extremes, potential PPE usage combined with strenuous workload.	5. IH monitoring, work/rest cycles (as required), proper selection of work clothing/PPE, personnel training.
	6. <u>Hazards noise levels</u> —drill rig, heavy equipment, hand tools.	6. IH sound level monitoring and/or dosimetry, source identification, hearing protection devices.
	7. <u>Stored energy</u> —Mechanical/thermal, elevated materials	7. Controlled work area, posted/labeled sources, training, isolation of energy source (lockout/tagout) for maintenance activities, as required.

beta)] and internal radiation (inhalable, ingestible, or absorbed radioactive contaminants) during these tasks. For purposes of this monitoring section, radiation (external) and contamination (internal) will be discussed separately and distinguished on the basis of their primary effects. Area, airborne, equipment, and personnel monitoring will be done by INTEC RADCON personnel based on direct-reading instrument readings, swipes, and other site-specific conditions. The project RCT may use instruments and sampling methods listed in Tables 8-6 and 8-7. Monitoring will be performed in accordance with the BBWI *Radiation Protection Manual*, MCP-139, "Radiological Surveys," MCP-425, "Surveys of Materials for Unrestricted Release and Control of Movement of Contaminated Material," and MCP-357, "Job-Specific Air Sampling/Monitoring."

8.3.2.1 Radiation Monitoring. The primary source of external radiation hazards during this project will be from radiation associated with contaminated environmental media (e.g., cuttings, cyclone debris, sludge). This material is not expected to generate radiation fields that would necessitate establishment of a radiation area.

RADCON personnel will use direct-reading radiation detectors (for example, ion chambers, Geiger-Mueller [GM] and neutron), thermoluminescent dosimeters (TLDs), and electronic dosimetry to measure and evaluate radiation exposures. The collected radiological data will be used to evaluate the effectiveness of engineering controls, ensure adequacy of work zone boundaries, alert project personnel to potential unexpected elevated radiation sources, and ensure the effectiveness of material handling methods and procedures.

8.3.2.2 Contamination Monitoring. The primary source of contamination will be contaminated environmental media (e.g., cuttings, cyclone debris, sludge) that may be encountered during drilling and sampling activities and decontamination tasks. Contamination hazards will be minimized by conducting contamination surveys and through using standardized sampling techniques, placement of barrier material (e.g., plastic sheeting) where feasible, and protective clothing.

Direct frisk and swipe collection and counting techniques will be used to monitor for alpha and beta-gamma. Low background alpha-beta counters may also be used to quantify contamination levels. RADCON personnel will use contamination monitoring data to evaluate the effectiveness of engineering controls, ensure adequacy of radiological area boundaries, alert project personnel to avoid contaminated areas, and ensure the effectiveness of personnel and equipment decontamination procedures.

8.3.2.3 Radiological Instrument and Equipment Calibration. RADCON personnel may use any of the radiation and contamination detectors and counters listed in Table 8-6 to provide radiological information to project personnel. When in use, portable survey instruments will receive a daily operational and source check to ensure they are within the specified baseline calibration limits. Accountable radioactive sources will be maintained in accordance with MCP-137, "Radioactive Source Accountability and Control." All radiological survey and monitoring equipment will be maintained and calibrated in accordance with the manufacturer's recommendations, existing RADCON protocol, and in conformance with the BBWI *Radiation Protection Manual*, MCP-93, "Instrumentation," and in accordance with 10 CFR 835.703(d).

8.3.2.4 External Dosimetry. Dosimetry for personnel conducting Phase I INTEC injection well drilling and sampling and associated support tasks for the OU 3-14 RI/FS will be specified in the task-specific RWP. All project personnel will wear personal dosimetry devices in accordance with the BBWI *Radiation Protection Manual* and as directed by INTEC RADCON personnel.

Table 8-5. Radionuclide and nonradiological hazards to be monitored during the Phase I INTEC injection well drilling and sampling. .^a

Tasks	Radiological and Nonradiological Hazards to be Monitored
Site preparation/equipment mobilization	Radionuclide contamination —(alpha, beta, gamma)—environmental media brought to surface, samples, sampling equipment, decontamination debris (as deemed appropriate by INTEC RADCON)
Core drilling	Hazards noise —drilling activities
Installing/completing wells	Mercury vapor —May be conducted as deemed appropriate by project IH
Sampling wells	Particulates not otherwise classified (PNOC) —All soil disturbance tasks have potential to generate dust. Sampling to be conducted by project IH based on site-specific conditions and proximity of personnel to dust generating task(s) for total and respirable fractions
Sample preservation	Dust, total nuisance (respirable) —bentonite usage, cyclone operations
Sampling equipment/drill rig decontamination (if required)	Crystalline silica dust (respirable) —silica sand handling/slurry mixing tasks

a. Monitoring and sampling will be conducted as deemed appropriate by project IH and RADCON personnel based on specific tasks and site conditions.

The Radiological Control and Information Management Systems (RCIMS) will be utilized to track external radiation exposures to project personnel. Individuals are responsible for ensuring all required personal information is provided to RADCON personnel for entry into RCIMS and logging in when electronic dosimeters are required.

8.3.2.5 Internal Monitoring. Internal radiation sources (removable and potential airborne contamination) will present the primary potential for internal exposure during soil sampling and handling tasks. The purpose of internal dose monitoring is to demonstrate the effectiveness of contamination control practices and to document the nature and extent of any internal uptakes, as specified in MCP-7. If required, internal dosimetry (whole body counts and bioassay) will be specified by the project radiological engineer and on the RWP.

Internal dose evaluation programs will adequately demonstrate compliance with Table 2-1 of 10 CFR 835(d). Project personnel are responsible for submitting all required bioassay samples on request.

8.3.3 Exposure Action Limits

Action levels have been established for hazards and contaminants that may be encountered during Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS to prevent and mitigate potential personnel exposure to radiological, nonradiological, and physical hazards. The project IH and RCT will evaluate drilling and sampling tasks using real-time monitoring as described in Section 8.3 based on the site-specific conditions.

Specific action levels will only apply if the hazard or contaminant listed on Table 8-7 is encountered. If action levels are reached, personnel will take the appropriate actions as listed. For PPE upgrades, the threshold for the particular level of PPE currently being worn must be exceeded or another type of contaminant introduced that will require modifications (i.e., Level C full-face ensemble offers a respiratory protection factor of 100 [nonradiological contaminants], so no further upgrade would be required if airborne contaminants were detected unless the protection factor is exceeded). For sustained airborne contaminants, full- or partial-period air samples will be collected to quantify the contaminant of concern.

8.4 Physical Hazards Evaluation, Control, and Monitoring

The physical hazards present during Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS and the methods that will be used to monitor and control them are described in this section. It is critical that all personnel are aware of and understand the nature of the tasks, the equipment to be used, and the controls in place to eliminate or mitigate potential safety hazards.

8.4.1 Temperature Extremes

Project activities will be conducted during months when both heat and cold stress factors could affect task-site personnel based on ambient air temperatures and layered PPE.

8.4.1.1 Heat Stress. For the drilling and sampling tasks, temperatures will be variable and personnel may be required to wear protective clothing that prevents the body from cooling. High ambient air temperatures can result in increased body temperature, heat fatigue, heat exhaustion, or heat stroke that can lead to symptoms ranging from physical discomfort to unconsciousness and death. Personnel must inform the FTL or HSO when experiencing any signs and/or symptoms of heat stress, or observing a fellow employee ("buddy") experiencing them. The BBWI *Safety and Health Manual*, MCP-2704, "Heat and Cold Stress," and Table 8-8 of this section describe heat stress hazards. Heat stress stay times will be documented on the SWP by the IH when personnel are required to wear PPE that may increase heat body

Table 8-6. Equipment available for monitoring radiological and nonradiological hazards.^a

Chemical or Radiological Hazard to be Monitored or Sampled	Equipment and Monitoring/Sampling Method^b	
Particulates not otherwise classified (PNOC) and crystalline silica	Personal sampling pumps with appropriate media for all partial and full period sampling	PNOC (total and respirable)—NIOSH 0600 Crystalline silica—NIOSH 7500, 7601, 7602
Mercury Vapor	Jerome mercury vapor analyzer (or equivalent)	
Radionuclide contamination (alpha)	Count-rate—Bicron/NE Electra (DP-6 or AP-5 probe) or equivalent Stationary—Eberline RM-25 (HP-380AB or HP-380A probe) or equivalent CAM—ALPHA 6-A-1 (in-line and radial sample heads, pump, RS-485) or equivalent (as required) Grab Sampler—SAIC H-810 or equivalent	
Radionuclide contamination (beta/gamma)	Count-rate—Bicron NE/Electra (DP-6, BP-17 probes) or equivalent Stationary—Eberline RM-25 (HP-360AB probe) or equivalent CAM (beta)—AMS-4 (in-line and radial head, pump RS-485) or equivalent (as required) Grab Sampler—SAIC H-810 or equivalent	
Radionuclide contamination (general counting)	LB-5100/NFS-RPS Counting System or equivalent Alpha/Beta Scalars Protean equivalent	
Personal contamination monitors	Eberline PCM-2 or PCM-1C or equivalent	
Radiation (gamma and neutron) fields and Geiger-Mueller (GM) instruments	Ion Chamber—Eberline RO-20 with RO-7 (2, 200 and 20K probes) or equivalent GM Dose Rate—Ludlum 2241 (HP-270 probe) or equivalent Electronic dosimetry—SAIC PD-3I with reader and RCMIS station or equivalent	
Hazardous noise levels (>85 dBA for an 8 hour workday, 83 dBA for a 10 hour day, >140 impact)	ANSI Type S2A sound level meter and/or ANSI S1.25-1991 dosimeter (A-weighted scale for TWA dosimetry, C-weighted for impact dominant sound environments)	
Heat/cold stress	Heat Stress—WBGT, body wt, fluid intake	Cold Stress—ambient air temp, wind chill charts
<p>a. Air sampling will be conducted as deemed appropriate by project IH and RADCON personnel based on initial direct reading instrument data, swipes, and other site factors.</p> <p>b. Equivalent validated air sampling method may be selected if more appropriate for site-specific conditions.</p> <p>ANSI = American National Standards Institute CAM = continuous air monitor dBA = decibel A-weighted TWA = time-weighted average WBGT = wet bulb globe temperature</p>		

Table 8-7. Action levels and associated responses for Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling project hazards.

Contaminant/Agent Monitored	Action Level		Response Taken if Action Levels Exceeded	
Mercury Vapor	0.01 – 0.025 mg/m ³ sustained in work area		Continue to monitor area and check worker’s breathing zone.	
	>0.025 sustained for 1 minute in workers’ breathing zone		If episodic—leave area until dissipates, perform continuous monitoring or don minimum Level C respiratory protection and continue working. If sustained—don minimum Level C respiratory protection. ^a	
Crystalline silica	0.05 mg/m ³ (respirable fraction)		Upgrade to Level C respiratory protection ^b .	
Hazardous noise levels	<85 dBA 8hr TWA, <83dBA 10hr TWA		No action.	
	85–114 dBA		Hearing protection required to attenuate to below 85 dBA 8 hr TWA or 83 dBA for 10hr TWA (based device NRR).	
	(a) >115 dBA	(b) >140 dBA	(a) Isolate source, evaluate NRR for single device, double protection as needed.	(b) Control entry, isolate source, only approved double protection worn.
Radiation field	<5 mrem/Hr		No action, no posting required.	
	5–100 mrem/hr @ 30 cm (§835.603.b)		Post as “Radiation Area”—Required items: RW I or II training, RWP, personal dosimetry.	
	>100 mrem - 500 Rad @ 100 cm (§835.603.b)		Post as “High Radiation Area”—Required items: RW II, RWP, alarming personal dosimetry, dose rate meter, and temporary shielding (as required).	
Radionuclide contamination	1-100 times RCM Table 2-2 values (§835.603.d)		Post as “Contamination Area” Required items: RW II training, personal dosimetry, RWP, don PPE, bioassay submittal (as required).	
	>100 times RCM Table 2-2 values (§835.603.d)		Post as “High Contamination Area”—Required items: RW II training, personal dosimetry, RWP (with pre-job briefing), don PPE, bioassay submittal (as required).	
Airborne radioactivity	Concentrations (μCi/cc) >30% of and DAC value (§835.603.d)		Post as “Airborne Radioactivity Area”—Required items: RW II training, personal dosimetry, RWP (with pre-job briefing), don PPE, bioassay submittal (as required).	
^a Level C respiratory protection for mercury will consist of a full-face respirator equipped with a MSA Mersorb® cartridge with end-of-service-life indicator (or equivalent) as prescribed by the project IH. A HEPA cartridge will be worn for airborne particulates. See Section 9, Personal Protective Equipment for additional Level C requirements.				
^b Level C respiratory protection for silica will consist of a full-face respirator equipped with a HEPA cartridge. See Section 9, Personal Protective Equipment for additional Level C requirements.				
CAM = continuous air monitor DAC = derived air concentration dBA = decibel A-weighted eV = electron volt NRR = Noise reduction rating RW = Radiological Worker RCM = Radiological Control Manual TWA = time weighted average				

Table 8-8. Heat stress signs and symptoms.

Heat-Related Illness	Signs and Symptoms	Emergency Care
Heat Rash	Red skin rash and reduced sweating	Keep the skin clean; change all clothing daily; cover affected areas with powder containing cornstarch or with plain cornstarch.
Heat Cramps	Severe muscle cramps, exhaustion, sometimes with dizziness or periods of faintness	Move the patient to a nearby cool place; give the patient half-strength electrolytic fluids; if cramps persist, or if more serious signs develop, seek medical attention.
Heat Exhaustion	Rapid, shallow breathing; weak pulse; <u>cold, clammy skin</u> ; <u>heavy perspiration</u> ; total body weakness; dizziness that sometimes leads to unconsciousness	Move the patient to a nearby cool place; keep the patient at rest; give the patient half-strength electrolytic fluids; treat for shock; seek medical attention. DO NOT TRY TO ADMINISTER FLUIDS TO AN UNCONSCIOUS PATIENT.
Heat Stroke	Deep, then shallow, breathing; rapid, strong pulse, then rapid, weak pulse; <u>dry, hot skin</u> ; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching	Cool the patient rapidly. Treat for shock. If cold-packs or ice bags are available, wrap them and place one bag or pack under each armpit, behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the neck. Seek medical attention as rapidly as possible. Monitor the patient's vital signs constantly. DO NOT ADMINISTER FLUIDS OF ANY KIND.

burden. These stay times will take into account the nature of the work (e.g., light, moderate, heavy), the type of PPE worn, and the ambient work temperatures.

Heat exhaustion and heat stroke are extremely serious conditions that can cause death. An individual showing any of the symptoms of heat exhaustion listed in Table 8-8 will do or be subject to the following:

- Stop work
- Exit or be helped from the work area
- Remove or decontaminate protective clothing (as applicable)
- Move to sheltered area to rest
- Be provided with cool drinking water
- Be monitored by a medic or CPR and first-aid certified employee.

Monitoring for heat stress conditions will be in performed accordance with BBWI *Safety and Health Manual*, MCP-2704, "Heat and Cold Stress." Depending on the ambient weather conditions, work conditions, type of PPE worn, and the physical response of work operations personnel, the IH will

inform the FTL or RCT of necessary adjustments to the work/rest cycle. Additionally, physiological monitoring may be conducted to determine if personnel are replenishing liquids fast enough. A supply of cool drinking water should be provided in designated eating areas and consumed only in these areas. Workers may periodically be interviewed by the IH, RCT, or HSO to ensure that the controls are effective and that excessive heat exposure is not occurring. Workers will be encouraged to monitor their body signs and to take breaks if symptoms of heat stress occur.

8.4.1.2 Low Temperatures. Exposure to low temperatures will only be a factor if project tasks are delayed until the fall months or relatively cool ambient temperatures and wet or windy conditions are experienced. The project IH and HSO will be responsible for obtaining meteorological information to determine if additional cold stress administrative controls are required. The BBWI *Safety and Health Manual*, MCP-2704, "Heat and Cold Stress," discusses the hazards and monitoring of cold stress. Table 8-9 provides the cold stress work/warm-up schedule if cold stress conditions exist (late fall, winter, early spring). Project personnel will also be cautioned regarding cold stress factors associated with rapid cooling once impermeable PPE layers are removed causing the potential for freezing of accumulated moisture on PPE outer and inner surfaces (under extremely cold conditions). Section 9 describes the requirements for the outer layer of protection based on radiological and nonradiological hazards.

Table 8-9. Cold stress work/warm-up schedule (for winter season).

Air Temp °F (approx.)	No Noticeable Wind		5-mph Wind		10-mph Wind		15-mph Wind		20-mph Wind	
	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks
-15° to -19°	Normal breaks	1	Normal breaks	1	75 min	2	55 min	3	40 min	4
-20° to -24°	Normal breaks	1	75 min	2	55 min	3	40 min	4	30 min	5
-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Nonemergency work should cease	
-30° to -34°	55 min	3	40 min	4	30 min	5	Nonemergency work should cease			
-35° to -39°	40 min	4	30 min	5	Nonemergency work should cease					
-40° to -44°	30 min	5	Nonemergency work should cease							
-45° and below	Nonemergency work should cease									

Additional cold weather hazards may exist from working on snow- or ice-covered surfaces. Slip, fall, and material handling hazards are increased under these conditions. Every effort must be made to ensure walking surfaces are kept clear of ice. The FTL or HSO should be notified immediately if slip or fall hazards are noted at the project site.

Personnel involved in drilling and sampling activities may be exposed to noise levels from the drill rig, hand tools, and compressors may that exceed 85 decibel A-weighted (dBA) for an 8-hour time-weighted average (TWA) or 83 dBA for 10-hour TWA. The effects of high sound levels (noise) may include the following:

- Personnel being startled, distracted, or fatigued

- Physical damage to the ear, pain, and temporary or permanent hearing loss
- Interference with communication that would warn of danger.

The IH will measure noise using instruments listed in Table 8-6. Noise measurements will be performed in accordance with the BBWI *Safety and Health Manual*, MCP-2719, “Hearing Conservation Program,” to determine if personnel assigned to the jobs identified are above allowable noise exposure levels. A TLV of 85 dBA TWA will be applied to personnel exposed to noise levels over no more than an 8-hour day. This level is based on a 16-hour “recovery” period in a low noise environment. If personnel are required to work longer than 8 hours in a hazardous noise environment, then the TLV will be adjusted to a lower value. The project IH must be consulted regarding modifications to the 85 dBA for an 8-hour TLV and 83 dBA for a 10-hour TWA value.

Personnel whose noise exposure routinely meets or exceeds the allowable level will be enrolled in the INEEL OMP or appropriate subcontractor hearing conservation program. Personnel working on jobs that have noise exposures greater than 85 dBA (83 dBA for a 10-hour TWA) will be required to wear hearing protection until noise levels have been evaluated, and will continue to wear the hearing protection specified by the IH until directed otherwise.

8.4.2 Fire and Flammable Materials Hazards

Flammable and combustible material hazards may include combustible materials near ignition sources (hot motor or exhaust system), and transfer and storage of flammable or combustible liquids in the SZ (fueling the drill rig and support equipment). Portable fire extinguishers with a minimum rating of 10A/60BC will be strategically located at the project site to combat Class ABC fires. They will be located in the EZ, on or near all site equipment that has exhaust heat sources, and on or near all equipment capable of generating ignition or sparking. A sufficient number of field team members will receive fire extinguisher training as listed in Table 4-1.

8.4.2.1 Project Equipment Fire Hazards. Combustible or ignitable materials in contact with or near exhaust manifolds, catalytic converters, or other ignition sources could result in a fire. The INTEC fire protection engineer should be contacted if questions arise regarding potential ignition sources. The accumulation of combustible materials will be strictly controlled at the project site. Disposal of combustible materials will be assessed at the end of each shift. Class A combustibles such as trash, cardboard, rags, wood, and plastic will be properly disposed of in metal receptacles in the SZ and in appropriate waste containers within the CRC, CRZ, and EZ.

Diesel fuel that may be used at the task site for fueling must be safely stored, handled, and used. Only FM/UL-approved flammable liquid containers labeled with the content will be used to store fuel. All fuel containers will be stored at least 15 m (50 ft) from any facilities and ignition sources, or stored inside an approved flammable storage cabinet. Additional requirements are provided in BBWI *Safety and Health Manual*, MCP-584, “Flammable/Combustible Liquids.” Portable motorized equipment (e.g., generators and light plants) will be shut off and allowed to cool down in accordance with the manufacturer’s operating instructions prior to refueling to minimize the potential for a fuel fire.

8.4.3 Biological Hazards

The Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS will be conducted in areas at INTEC where there is a potential for encountering significant nesting materials. The facility is located in an area that provides habitat for various rodents, insects, and reptiles. Biological studies at the INEEL have shown that local deer mice can carry the hantavirus. The virus is in the nesting

and fecal matter of deer mice. Project personnel could disturb nesting or fecal matter during drilling activities. If such materials are disturbed, they can become airborne and create a potential inhalation pathway for the virus. Contact with and improper removal of these materials may increase inhalation exposure risks.

If suspected rodent nesting or excrement material is encountered, the project IH will be notified immediately and **no attempt will be made to remove the material or clean the area**. Following an evaluation of the area, an SWP will be written for disinfecting and removing material of concern from the project task area. The IH will provide the necessary guidance for protective equipment, mixing, and application of the disinfecting solution (bleach solution), and proper disposal method of the waste in accordance with MCP-2750, "Preventing Hantavirus Infection."

8.4.4 Confined Spaces

Drilling and sampling tasks will not be conducted in areas that have been posted or are designated as confined spaces in accordance with MCP-2749, "Confined Spaces."

8.4.5 Safety Hazards

Industrial safety hazards pose a significant, if not the most likely, threat to personnel during drilling and sampling tasks. Section 6 describes general safe work practices that must be followed at all times. The following sections describe specific industrial safety hazards and procedures to eliminate or minimize potential hazards to project personnel.

8.4.5.1 Handling Heavy Objects. Well drilling, handling, and maneuvering steel casing, bits, full core sections, filled sample coolers, and various other pieces of equipment may result in employee injury. Manual material handling will be minimized through task design and use of mechanical and hydraulic lifts whenever possible.

8.4.5.2 Powered Equipment and Tools. All powered equipment and tools will be properly maintained and used by qualified individuals and in accordance with the manufacturer's specifications. The BBWI *Safety and Health Manual*, MCP-2735, "Hand and Portable Power Tools," will be followed for all work with powered equipment, including powered steam cleaners.

8.4.5.3 Heavy Equipment and Moving Machinery. The hazards associated with the operation of heavy equipment include injury to personnel, equipment damage, and property damage. All heavy equipment will be operated in the manner intended and according to manufacturer's instructions. Only authorized personnel will be allowed in the vicinity of operating heavy equipment and should maintain visual communication with the operator. Work-site personnel will comply with BBWI *Safety and Health Manual*, MCP-2745, "Heavy Industrial Vehicles"; MCP-2743, "Motor Vehicle Safety"; and MCP-2744, "Powered Industrial Trucks."

Site personnel working around or near heavy equipment and other moving machinery will comply with the appropriate BBWI PRD-160, *Hoisting and Rigging*, and DOE-STD-1090-96, *Hoisting and Rigging*, as applicable and appropriate. Additional safe practices:

- Movement of drill string section with the catline or overhead hoist system will be limited based on wind restrictions for safe operations in accordance with PRD-160, "Hoisting and Rigging." The HSO or designee is responsible for obtaining wind speed readings from the INEEL Warning Communications Center (WCC) or weather station. A 25-mph wind

restriction will be enforced for all hoisting and rigging operations as defined by PRD-160, *"Hoisting and Rigging."*

- All heavy equipment will have backup alarms
- Walking directly in back of or to the side of heavy equipment without the operator's knowledge will be prohibited; all precautions will have been taken prior to moving heavy equipment
- While operating heavy equipment in the work area, the equipment operator will maintain communication with a designated person responsible for providing direct voice contact or approved standard hand signals; in addition, all site personnel in the immediate work area will be made aware of the equipment operations
- All equipment will be kept out of traffic lanes and access ways and will be stored so as not to endanger personnel at any time.

8.4.5.4 Drilling Hazards. Air rotary drilling (or equivalent) will be used at the INTEC well locations to core to the required depths. Drilling personnel will be aware of potential drilling equipment hazards and body positioning during all material handling tasks. Special attention will be paid to keeping hands away during drill steel attachment and movement. If air is used as the circulating fluid, a surface diversion will be attached to the surface casing. This diversion will be under a slight negative pressure and discharged through a cyclone separator equipped with a closed containment system (e.g., Dust Hog) with back flush capabilities on the filters. The containment system will be constructed to allow the installation of a Flanders type high-efficiency particulate air (HEPA) filtration system after the prefilters. Some of the primary hazards associated with drill rigs are described below.

8.4.5.4.1 Slips—Slips are toothed wedges positioned between the drill pipe and the master bushing or rotary cable to suspend the drill string in the well bore when it is not supported by the hoist. Most accidents associated with slip operations are related to manual materials handling; strained backs and shoulders are common.

8.4.5.4.2 Tongs—Tongs are large, counterweighted wrenches used to break apart torqued couplings on the drill pipe. Both sets of tongs have safety lines; when breakout force is applied to the tongs, the tongs or the safety lines can break and injure a worker standing near them. Accidents can occur when the driller activates the wrong tong lever, and an unsecured tong swings across the rig floor at an uncontrolled velocity. A common accident attributable to tongs can occur when a worker has a hand or finger in the wrong place when attempting to swing and latch the tong onto the drill pipe, resulting in crushing injuries to or amputation of the fingers.

8.4.5.4.3 Elevators—Elevators are a set of clamps affixed to the bails on the swivel below the traveling block. They are clamped to each side of a drill pipe and hold the pipe as it is pulled from the well bore. Accidents and injuries can occur during the latching and unlatching tasks; fingers and hands can be caught and crushed in the elevator latch mechanism. If the pipe is overhead when the latching mechanism fails, the pipe may fall on workers working on the drill floor.

8.4.5.4.4 Catlines—Catlines are used on drilling rigs to hoist material. Accidents that occur during catline operations may injure the worker doing the rigging as well as injure the operator. Minimal control over hoisting materials can cause sudden and erratic load movements, which may result in hand and foot injuries.

8.4.5.4.5 Working Surfaces—The rig floor is the working surface for most well drilling tasks. The surface is frequently wet from circulating fluid, muddy cuttings, and water used or removed from the borehole during drilling operations. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, slips, and falls.

8.4.5.4.6 Materials Handling—The most common type of materials handling accident is a finger or toe caught between two objects. Rolling stock can shift or fall from a pipe rack or truck bed. Fingers and hands can be caught between sampling barrels, breakout vises, and tools.

8.4.5.5 Electrical Hazards/Energized Systems. Electrical equipment and tools may pose shock or electrocution hazards to personnel. Safety-related work practices will be employed to prevent electric shock or other injuries resulting from direct or indirect electrical contact. If work on energized systems is necessary, these practices will conform to the requirements in the BBWI *Safety and Health Manual*, MCP-2731, “Electrical Safety,” the BBWI *Operations Manual*, MCP-3650, “Level I Lockouts and Tagouts,” or MCP-3651, “Level II Lockouts and Tagouts,” facility supplemental MCPs, and Parts I through III of National Fire Protection Association (NFPA) 70E. In addition, all electrical work will be reviewed and completed under the appropriate work controls (for example, HASP, SWPs, and work orders).

8.4.5.6 Personal Protective Equipment. Wearing PPE will reduce a worker’s ability to move freely, see clearly, and hear directions and noise that might indicate a hazard. PPE can increase the risk of heat stress. Work activities at the task site will be modified as necessary to ensure that personnel are able to work safely in the required PPE. Work-site personnel will comply with BBWI *Safety and Health Manual*, MCP-2716, “Personal Protective Equipment,” and *Radiation Protection Manual*, MCP-432, “Radiological Personal Protective Equipment.” The PPE levels for each task are described in Section 9.

8.4.5.7 Decontamination. Decontamination procedures for personnel and equipment are detailed in Section 10 and in the Phase I INTEC injection well SAP for the OU 3-14 RI/FS. These procedures are the primary decontamination method for all personnel and equipment that enter the EZ and radiological controlled areas. The appropriate BBWI MCPs provide additional directions for chemical and radionuclide decontamination.

When required, decontamination procedures (Section 10) and applicable MCPs must be followed and the appropriate level of PPE must be worn during decontamination activities. Project RADCON and IH personnel will follow BBWI *Radiation Protection Manual*, MCP-148, “Personnel Decontamination,” and *Safety and Health Manual* 14B, MCPs, and general IH practices; for sampling activities, the Phase I INTEC injection well FSP for the OU 3-14 RI/FS (DOE-ID 2000b) will be followed.

8.4.6 Inclement Weather

When inclement or adverse weather such as sustained strong winds 25 mph or greater, electrical storms, heavy precipitation, or extreme heat or cold threatens people or property at the task site the HSO, with input from the IH, SE, RCT, and other personnel, will evaluate weather conditions and decide whether to stop work, employ compensatory measures, or proceed. The FTL and HSO will comply with INEEL MCPs and site work control documents that specify limits for inclement weather.

During all site activities, the project HSO, in consultation with RADCON and IH personnel, will determine if wind or other weather conditions pose unacceptable hazards to personnel or the environment.

8.5 Other Site Hazards

Task site personnel should continually look for potential hazards and immediately inform the FTL or HSO of the hazards so that action can be taken to correct the condition. The HSO, RCT, and FTL will be at the project site and visually inspect the site to ensure that barriers and signs are being maintained, unsafe conditions are corrected, and debris is not accumulating. The SE, HSO, or FTL will periodically inspect safety conditions in accordance with MCP-3449, "Safety and Health Inspections." Additionally, targeted and/or required self-assessments may be done during drilling operations in accordance with MCP-8, "Self-Assessments Process for Continuous Improvement." All inspections and assessments will be noted in the FTL logbook.

Health and safety professionals at the task site may, at any time, recommend changes in work habits to the FTL. However, all changes that may affect the project written work control documents (e.g., HASP, JSAs, RWPs, SWPs) must have concurrence from the appropriate project technical discipline representative onsite and a document action request must be prepared as required.

Personnel working at the task site are responsible for using safe work techniques, reporting unsafe working conditions, and exercising good personal hygiene and housekeeping habits.

9. PERSONAL PROTECTIVE EQUIPMENT

The primary hazards associated with the WAG 3 OU 3-14 injection well (site CPP-23) relate to industrial safety (drill rig operation, material handling, and vehicle operation). Additional potential hazards exist from contact with contaminated environmental media. If contamination has migrated within the well development vertical profile it is likely that it would only be found at discrete intervals. Contact is possible during sample collection, handling, and sampling equipment decontamination tasks. Anyone entering the CRZ and EZ must be protected against potential safety and contaminant exposure hazards. Each task associated with drilling and sampling operations is unique and the required PPE will be dependent upon type of task, proximity to the hazard, and potential for exposure. This section addresses PPE to be worn for drilling and sampling tasks and contingencies for upgrading and downgrading PPE.

The purpose of PPE is to shield or isolate personnel from chemical, radiological, physical, and biological hazards that cannot be eliminated or controlled through engineering or other practices. It is important to realize that no one PPE ensemble can protect against all hazards under all conditions and that proper work practices and adequate training will augment PPE to provide the greatest level of protection to workers.

Selection of the proper PPE to protect project site personnel is based on the following:

- Specific conditions and nature of the drilling and sampling related task (e.g., well installation, sampling, handling, equipment decontamination)
- Radiological and nonradiological materials and agents associated with the WAG 3 OU 3-14 injection well (site CPP-23)
- Contaminant routes of entry
- Physical form and chemical characteristics of contaminants
- Acute and chronic effects from exposure to contaminants
- Local and systemic toxicity of contaminants
- Anticipated exposure levels (surface and airborne)
- The hazard analysis (Section 8) evaluation of this HASP.

If radiological contamination is encountered at levels requiring the use of anticontamination clothing, these requirements will be stated in a task-specific RWP developed in conformance with BBWI *Radiation Protection Manual*, MCP-432, "Personal Protective Equipment."

PPE is generally divided into two broad categories: (1) respiratory protective equipment, and (2) personal protective clothing. Both categories are incorporated into the traditionally recognized four levels of personal protection equipment (Levels A, B, C, and D). Table 9-1 provides guidance for selecting respiratory and protective clothing. Based on the nature of the tasks and associated hazards, a combination of PPE Level D and modified Level D is anticipated. However, respiratory protection may be required if contaminants are detected above established action levels or if engineering controls fail to reduce contaminant concentrations below the action levels. The Phase I INTEC injection well drilling and sampling site for the OU 3-14 RI/FS will be monitored by sampling support personnel (RADCON and IH) to evaluate changing conditions and to determine the most appropriate PPE level (including

modifications). Task-based PPE (respiratory protection and protective clothing) required and potential upgrades are listed in Table 9-2.

Table 9-1. Respiratory and protective clothing selection guidance.

Hazard	Level of Protection
Respiratory PPE Selection ^a	
Not immediately dangerous to life or health (IDLH) or oxygen deficient atmospheric conditions. Gaseous, vapor, particulate and/or aerosol chemicals/radionuclides.	Level C—full-facepiece, as determined by IH/RADCON Level B—full-facepiece supplied air respirator with an air-purifying escape cartridge or airhood (bubblehood) HEPA/chemical combination cartridge for concentrations up to the protection factor of an air-purifying full-facepiece respirator and within the assigned DAC ^b value
IDLH or oxygen deficient atmospheric conditions. Gaseous, vapor, particulate and/or aerosol chemicals/radionuclides.	Level B—full-facepiece, supplied air respirator with an escape-only SCBA ^c or Level A—self-contained breathing apparatus HEPA/chemical combination cartridge for concentrations up to the protection factor of an air-purifying full-facepiece respirator and within the assigned DAC ^b value
Protective Clothing Selection	
Low atmospheric contaminant levels under stable conditions. No anticipated immersion, splashes, or potential for unexpected contact with chemical or radiological contaminants.	Level D
Moderate atmospheric contaminants under relatively stable conditions, liquid splashes or other direct contact that do not have corrosive characteristics or can be absorbed by exposed skin. Low radionuclide contamination and airborne radioactivity levels. ^d	Level C (Contingency Only)
Moderate to high atmospheric contaminants under unstable conditions, potential for contact with wet, contaminated surfaces/material that can saturate or permeate Level C protective clothing. Moderate radionuclide contamination and airborne radioactivity levels. ^d	Level B ^c (Not anticipated to be worn)
High and unknown atmospheric contaminants, potential for contact with substances that pose a high hazard potential to the skin, high potential for splash, immersion, or exposure to unexpected vapors, gases, aerosols, or dusts that may present an IDLH situation/readily absorbed through the skin. High radionuclide contamination and airborne radioactivity levels. ^d	Level A ^e (Will not be worn)
<p>a. A multichemical/high-efficiency particulate air (HEPA) combination cartridge to be selected by IH and RADCON personnel based on specific task hazards.</p> <p>b. Derived air concentration (DAC) based on specific radionuclides.</p> <p>c. SCBA = self-contained breathing apparatus.</p> <p>d. Contamination levels and airborne radioactivity as defined by 10 CFR 835.603.d.</p> <p>e. Levels A and B PPE are not anticipated to be required for personnel conducting Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling tasks.</p>	

Table 9-2. Phase I INTEC injection well drilling and sampling task-based personal protective equipment requirements and modifications for the OU 3-14 RI/FS.

Task	Level of PPE	Primary or Contingency	Modifications and Comments
Tasks with Low Potential for Airborne or Contact with Contaminated Environmental Media			
<ul style="list-style-type: none"> • Site preparation • Drilling and sampling tasks • Demobilization 	Level D	Primary	Level D PPE as defined in Section 9.2.1. Modification for specific hand protection for personnel will be defined in the SWP and/or RWP.
	Modified Level D	Upgrade Contingency	Upgrading to modified Level D (protective clothing, Tyvek coveralls or equivalent) may be required if contamination (radiological or nonradiological) is detected.
	Level C	Upgrade Contingency	If airborne contaminants increase to concentrations above established action limits, Level C full-face air-purifying respiratory protection (chemical/radiological combination cartridge) will be worn in conjunction with chemical protective clothing.
Tasks with Moderate to High Potential for Airborne or Contact with Contaminated Environmental Media			
<ul style="list-style-type: none"> • Cyclone material handling • Silica sand/flour mixing • Decontamination tasks • Sample preservation • All drilling and sampling task where contact with environmental media is likely <i>IF radiological contamination or mercury vapor is present.</i> 	Modified Level D	Primary	Modified Level D (coveralls, Tyvek coveralls or equivalent), taped at seams if contamination (radiological or nonradiological) is detected and contact with environmental media cannot be avoided. Additional Level D modification for specific hand/face protection for samplers and personnel conducting decontamination may be defined by JSA and /or RWP.
	Level C	Upgrade Contingency	If airborne contaminants increase to concentrations above established action limits, Level C full-face air-purifying respiratory protection (chemical/radiological combination cartridge) will be worn in conjunction with chemical protective clothing.

9.1 Respiratory Protection

Table 9-2 identifies the tasks with moderate to high potential for generation of airborne respiratory hazards. An additional airborne hazard exists when preserving QA rinsate samples. IH and RADCON monitoring will focus on moderate to high potential hazard activities to verify airborne contaminants are below the action limits. Respiratory protection will be made available only as a contingency if action limits are exceeded or site conditions change such that additional respiratory protection is required (i.e., upgrading is necessary). If respiratory protection is required, assigned protection factors for respiratory devices listed on Table 9-3 will not be exceeded.

All personnel required to wear respirators will complete training and be fit-tested before being assigned a respirator in accordance with training and documentation requirements described in Section 4 of this HASP. Directions for respirator use, emergency use, storage, cleaning, and maintenance, as stated in the BBWI *Safety and Health Manual*, MCP-2726, "Respiratory Protection," will be followed.

9.2 Personal Protective Equipment Levels

9.2.1 Personal Protective Equipment

The following sections explain the four levels of PPE in detail. Modifications to these levels will be made under the direction of the HSO in consultation with the project IH and RADCON personnel, as appropriate. Such modifications are routinely employed during HAZWOPER site activities to maximize efficiency and to meet site-specific needs without compromising personnel safety and health. Based on the potential for contact with contaminated environmental media during drilling and sampling tasks, special attention will be given to both respiratory and protective clothing contingencies. Table 9-2 lists each task or assignment and the corresponding level of PPE, as well as any additional or special items necessary for personal protection at the task site. The HSO, IH, and RADCON personnel will determine what modifications to the PPE levels listed on Table 9-2 are appropriate. Level D Personal Protective Equipment

Level D or modified Level D will be the primary PPE level for Phase I INTEC injection well drilling and sampling activities for the OU 3-14 RI/FS (unless contamination is encountered). Level D PPE will only be selected as a work uniform and not on a site with respiratory or skin absorption hazards requiring whole body protection. This level provides no protection against airborne chemical hazards, but rather is used for protection against nuisance contamination and physical hazards. Level D PPE will only be allowed in areas that have been characterized or are known to have never been contaminated.

Table 9-3. Assigned protection factors for respiratory devices.^a

Type of Respirator	Respiratory Inlet Covering (full facepiece)	
Full-face air-purifying with appropriate cartridge	Chemical Agents 100 ^b	Radionuclides 100 ^{c,d}

a. ANSI Z88.2-1992.
b. BBWI MCP-2726
c. Particulates only. When HEPA filters are used in atmospheres not containing radioactive gas.
d. BBWI MCP-432.

Level D or modified level D PPE will be the primary level of protective clothing and equipment worn for most tasks. The Level D PPE ensemble may be modified by the IH and/or the RCT to protect the skin or to protect from other physical hazards, but will not include the addition of respiratory protection.

- Level D PPE consists of the following:
 - Coveralls or standard work clothes (as determined by the IH and/or RCT)
 - Hard hat (as required by SE and type of work being performed)
 - Eye protection, safety glasses with side shields as a minimum (see BBWI *Safety and Health Manual*, MCP-2716, “Personal Protective Equipment”)
 - Hand protection for all material-handling tasks (leather or other material specified by the IH)
 - Safety footwear (steel or protective toe and shank, as determined by the SE).
- Optional Level D Modifications consists of the following:
 - Chemical or radiological protective clothing (e.g., Tyvek and Saranex) as prescribed in site-specific RWP or SWP
 - Chemically resistant hand and foot protection (e.g., inner/outer gloves and boot liners)
 - Radiological modesty garments under outer protective clothing
 - Any specialized protective equipment (e.g., hearing protection and face shields).

9.2.2 Level C Personal Protective Equipment

Level C PPE will be worn when the task site chemical and/or radiological contaminants have been well characterized (indicating that personnel are protected from airborne exposures by wearing air-purifying respirators with the appropriate cartridges), no oxygen-deficient environments exist (<19.5% at sea level), and no conditions pose immediate dangers to life or health (IDLH). Basic Level C PPE includes:

- Level D ensemble (with the following respiratory and whole body protection upgrades)
 - Full-facepiece air-purifying respirator equipped with a NIOSH approved cartridge (IH to specify type of cartridge [organic vapor, HEPA, or combination])
 - Chemical-resistant coveralls (e.g., Tyvek QC, Tychem 7500, and Saranex-23-P) as prescribed in site-specific RWP or SWP (IH to specify material)
 - Chemical-resistant outer shoe/boot cover (IH and/or RCT to specify material)
 - Inner chemical-resistant nitrile rubber gloves with cotton liners (as determined by the IH and/or RCT)
 - Outer chemical-resistant Viton or polyvinyl alcohol gloves (as determined by the IH).

- Optional Level C Modifications:
 - Radiological modesty garments under outer protective clothing
 - Any specialized protective equipment (e.g., hearing protection and aprons).

9.3 Protective Clothing Upgrading and Downgrading

The Phase I INTEC injection well drilling and sampling project HSO for the OU 3-14 RI/FS, in consultation with the project IH and RADCON personnel, will be responsible for determining when to upgrade or downgrade PPE requirements. Upgrading or downgrading PPE requirements based on current conditions is a normal occurrence. Action levels, listed in Table 8-7, provide the chemical and radiological basis for determining such decisions. If changing conditions are encountered, new work control documents (e.g., SWPs, RWPs, JSAs) may need to be written or revised to reflect these changes. If PPE is upgraded or downgraded, the project HSO will consult with RADCON personnel to evaluate RWP requirements.

Additional reasons for upgrading or downgrading include:

- Upgrading criteria or conditions (work will stop immediately if an upgrade in PPE is required)
 - Unstable or unpredictable site radiological and/or nonradiological hazards
 - Contaminants difficult to monitor or detect
 - Known or suspected skin absorption hazards
 - Temporary loss or failure of any engineering controls
 - Identified source or potential source of respiratory hazards
 - Change in the task that may increase contact with contaminants or may meet any of the criteria listed above.
- Downgrading Criteria
 - New information or monitoring data that show contaminant levels to be consistently lower than established action limits
 - Implementation of new engineering or administrative controls that eliminate or significantly mitigate hazards
 - Elimination of potential skin absorption or contact hazards
 - Change in site conditions that results in removal of physical hazards or reduces or isolates them to a controlled area
 - Completion or change in tasks that results in the elimination of key hazards that require higher levels of PPE.

9.4 Inspection of PPE

All PPE ensemble components must be inspected both prior to use and when in use within project work zones. Once PPE is donned, self-inspection and the use of the buddy system will serve as the principal forms of inspection. If at any time PPE should become damaged or degradation/permeation is suspected, an individual will inform others of the problem and proceed directly to the work zone exit point to doff and replace the unserviceable equipment. Additionally, all PPE that becomes grossly contaminated or presents a potential source for the spread of such contamination will be decontaminated or replaced as directed by the HSO or RCT, as appropriate. Table 9-4 provides an inspection checklist for common PPE items.

Table 9-4. PPE inspection checklist.

PPE Item	Inspection
Gloves	<p><u>Before use:</u></p> <p>Pressurize gloves to check for pinholes: blow in the glove, then roll until air is trapped and inspect. No air should escape. Visually inspect leather gloves for integrity.</p> <p><u>While wearing in the work zone:</u></p> <p>Inspect for tears, punctures, and damage. Check all taped areas to ensure gloves are still intact.</p>
Respirators (full-facepiece air-purifying)	<p><u>Before use:</u></p> <p>Check condition of the facepiece, head straps, valves, connecting lines, fittings, all connections for tightness.</p> <p>Check cartridge to ensure proper type/combination for atmospheric hazards to be encountered, inspect threads and O rings for pliability, deterioration, and distortion.</p> <p><u>While wearing in the work zone:</u></p> <p>Check to ensure no leakage can be detected and straps are secure. If breathing resistance or chemical break-through is experienced, exit the area following posted doffing instructions and report problem to IH.</p>
Modified Levels D and C protective clothing	<p><u>Before use:</u></p> <p>Visually inspect for imperfect seams, nonuniform coatings, tears, etc. Hold PPE up to the light and inspect for pinholes, deterioration, stiffness, and cracks.</p> <p><u>While wearing in the work zone:</u></p> <p>Check for evidence of chemical attack, such as discoloration, swelling, softening, and material degradation. Inspect for tears, punctures, and zipper or seam damage. Check all taped areas to ensure they are still intact.</p>

10. DECONTAMINATION PROCEDURES

Every effort will be made to prevent contamination of personnel and equipment. This effort includes the use of engineering controls, isolation of source materials, site monitoring and surveying, personnel contamination control training, and following all contaminated material handling procedures.

10.1 Contamination Control and Prevention

Radionuclide and nonradiological contaminants that may be found during the Phase I INTEC injection well drilling and sampling project for the OU 3-14 RI/FS are presented in Tables 8-1 and 8-2. The use of engineering controls, protective barriers, protective clothing, modified work control practices, or addition of hold points and surveys will all be used to minimize direct contact and handling of environmental media. Everything that enters the Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling area and contacts contaminated environmental media could potentially become contaminated. Contamination control and prevention practices will be implemented during drilling and sampling tasks to minimize personnel contact with contaminated soil and surfaces. The following contamination control and prevention measures will be employed:

- Identifying sources of contamination and designing containment, isolation, and engineering controls (where feasible) to eliminate or mitigate any potential for contact with or release of contaminants
- Limiting the equipment, materials, and number of personnel that enter the contaminated area
- Surveying periodically and collecting smears during drilling and sampling tasks. If contamination is found on the outer surfaces of equipment, decontamination procedures will be followed to prevent the spread of contamination (see Section 10.2.3).
- Using only the established control entry point to and exit point from the contaminated area to minimize the potential for cross-contamination and expedite contamination control surveys
- Wearing disposable outer garments and using disposable equipment (where possible).

10.2 Personnel and Equipment Decontamination

Decontamination procedures for personnel and equipment are necessary to prevent the spread of contamination and protect personnel. Both chemical and radionuclide contamination will be decontaminated from surfaces (as encountered) at the exit from a contaminated area (if required to be established) and other work zone transition boundaries (CRZ for nonradiological nonhazardous materials, as appropriate).

Any radionuclide decontamination operations required for equipment or areas will be performed in accordance with Chapter 4 of the INEEL *Radiation Protection Manual* and at the direction of INTEC RADCON personnel. Nonradionuclide decontamination will be evaluated on a case-by-case basis by the HSO and project IH to determine the most appropriate PPE (Level C protective clothing will initially be selected if airborne contaminants may be generated above the action limits until site monitoring can demonstrate downgrading is warranted). Specific personnel and equipment decontamination methods are described in the following sections.

10.2.1 Personnel Decontamination

Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS will initially be conducted in Level D or modified Level D PPE unless upgrading is warranted. Engineering controls in conjunction with project contamination prevention and control practices and proper protective clothing donning and doffing procedures will be the primary means to eliminate the need for personnel decontamination.

The greatest potential for personnel contamination is improper doffing of contaminated protective equipment when exiting a radiologically controlled area. If modified Level D is required, procedures for donning and doffing protective clothing will be posted at the entrance and exit to all radiologically controlled areas. All PPE items will be inspected before being donned, following the list in Section 9, Table 9-4. Following the donning of protective clothing, the worker's buddy, the HSO, or the RCT will check to verify proper donning technique.

The modified Level D and C PPE selection, as identified in the RWP and by the HSO, will provide for the layered barriers required to prevent permeation and minimize external surface contamination. The options for the outermost protective clothing layer (e.g., Tyvek QC and Saranex-23C) will depend on the likelihood for deposition of contaminants and the specific tasks, as listed in Table 9-2.

10.2.2 Decontamination in Medical Emergencies

An ill or injured person will immediately be evaluated by first aid trained personnel at the project task site. If the injury or illness is serious, then the FTL will contact the INTEC SS or the WCC (if the SS cannot be reached) to summon emergency services. The PM and others will also be contacted, as described in Section 11.

Medical care for serious injury or illness will not be delayed for decontamination. In such cases, gross decontamination may be conducted by removing the injured person's outer protective clothing (if possible) and other contaminated areas contained in a bag, glove, or similar covering. If contaminated PPE cannot be removed without causing further injury (except for the respirator, which must be removed), potentially contaminated areas of the individual will be wrapped in plastic, blankets, or available material to help prevent contaminating the inside of the ambulance, medical equipment, and medical personnel. The IH or RCT (depending on the type of contamination) will accompany the employee to the medical facility to provide information and decontamination assistance to medical personnel. Contaminated PPE will then be removed at the Central Facilities Area (CFA) medical facility (CFA-1612) and carefully handled to prevent the spread of contamination. The INEEL *Radiation Protection Manual*, Chapter 5, and MCP-148, "Personnel Decontamination," contain information about proper handling of radionuclide-contaminated wounds.

10.2.3 Equipment Decontamination

Isolation controls will be established where feasible to prevent contact with contaminated environmental media. Tools and sampling equipment will be decontaminated as described in the Phase I INTEC injection well FSP for the OU 3-14 RI/FS (DOE-ID 2000b). Sample containers may be wrapped and threads covered to minimize soil contamination during filling tasks if contamination is encountered. Project IH and RADCON personnel will survey and collect swipes to identify contamination and evaluate isolation methods, material handling techniques, and storage requirements. If extensive decontamination of equipment is required, then the RWP will need to be modified or a new RWP written to identify the PPE dress category and other RADCON requirements.

Both real-time instrumentation and visual observation will be used to detect contamination on drilling equipment and sample container surfaces. If required, equipment and personnel decontamination will utilize both instrumentation and visual methods for contamination detection and to minimize the potential spread and airborne generation of contaminants.

Where radiological and IH concerns do not prohibit use, BBWI *Environmental Manual*, TPR-52, "Decontamination of Sampling Equipment in the Field," and TPR-51, "Decontamination of Heavy Equipment in the Field," will be followed. The RADCON and IH personnel will evaluate any contaminated equipment to determine the most appropriate decontamination method based on the nature of the contaminated item, level of contamination, required effort to decontaminate the item, and requirement for decontaminating versus disposing of such items. In some cases, the level of effort and potential for spreading contamination during decontamination far outweigh the benefit from engaging in extensive decontamination efforts to return an item to service. A cost-ALARA versus benefit evaluation will be done on items that have extensive contamination or are relatively inexpensive. Low-cost consumable items will be discarded if initial decontamination efforts fail or extensive decontamination is required that is not in accordance with ALARA principles.

If nonradionuclide decontamination is required to release equipment, a decontamination pad may be established in the CRC. If the project IH thinks it appropriate, the equipment can be wet wiped with an amended water solution (amended with a nonphosphate detergent, such as Alconox) or steam cleaned before it leaves the CRC. An attempt will be made to wipe contaminated surfaces first to minimize generation of waste materials and prevent free liquids from having to be containerized. It is not anticipated that steam cleaning will be required; however, a drainage system that allows for a single collection point will be established if steam cleaning is necessary. Decontamination wastewater will be collected using a submersible pump and containerized and characterized in accordance with the BBWI *Environmental Management Procedures Manual*.

10.3 Doffing PPE and Decontamination

As stated earlier, no personnel decontamination beyond doffing of PPE is anticipated for this project. If contamination is detected on outer PPE layers, **careful removal of these outer PPE layers will generally eliminate over 99% of surface contamination** and this careful removal will be the primary decontamination method if protective clothing is contaminated. Removal of contaminated protective clothing using standard radiological doffing techniques (rolling outer surfaces inward while PPE is being removed) provides the most effective method for containing and isolating the contaminants and greatly reduces the potential for exposure to other personnel, who would be put at risk of cross-contamination through use of other decontamination methods such as washing or brushing.

Some preliminary surface decontamination of protective clothing may be required if it is grossly contaminated with environmental media and the potential for the generation of airborne radioactivity or organic vapor emissions exists. This will involve assistance from other personnel inside the contamination area and at the doffing location. The ultimate goal of all decontamination methods is to isolate the source of contamination effectively and efficiently through removal and containment of protective clothing in a sealed bag or waste container.

The specific doffing sequence of modified Level D or C PPE, and any required decontamination, will be based on the nature of the contamination and specific Phase I INTEC injection well OU 3-14 RI/FS drilling and sampling project site configuration. A general approach for doffing modified Level D or C PPE is described below. However, there is no one doffing strategy that works for all circumstances. Modifications to this approach are appropriate if site conditions change or at the discretion of the project

HSO in consultation with the project IH and INTEC RADCON personnel. Both radiological and nonradiological (chemical) hazards will be evaluated.

10.3.1 Modified Level D PPE Doffing and Decontamination

Modified Level D protective clothing (e.g., Tyvek coveralls and booties) will be doffed following standard radiological removal techniques (as posted) and will constitute the initial decontamination step. If the protective clothing is also being worn as an anticontamination layer, then tape, gloves, booties, and any required dosimetry will be removed following the posted doffing sequence. All PPE will be placed in the appropriately labeled waste containers for disposal. Doffing and any required decontamination will take place at the EZ/CRC boundary or in a contamination radiological buffer area (RBA)/step-off pad boundary (if a radiological contamination area is established). If personnel are exiting a radiologically controlled area, doffing will be followed by a personal contamination survey as stated in the RWP.

10.3.2 Level C PPE Doffing and Decontamination

If respiratory protection is worn in conjunction with protective clothing (Level C PPE), then the modified Level D sequence will be followed with one additional step. Following protective clothing doffing, respirators will be removed and placed in a separate container. Doffing and any required decontamination will take place at the EZ/CRC boundary or in a contamination RBA/step-off pad boundary (if a radiological contamination area is established). If personnel are exiting a radiologically controlled area, doffing will be followed by a personal contamination survey as stated in the RWP.

10.4 Personnel Radiological Contamination Monitoring

If a radiological control area is established for activities at the Phase I INTEC injection well drilling and sampling site for the OU 3-14 RI/FS, personnel must survey for contamination in accordance with the RWP before exiting the established radiological control area and using any eating area within the INTEC operations area. Personnel will conduct contamination surveys utilizing an existing personal contamination monitor (PCM) or other available instruments as stated in the RWP and as directed by INTEC RADCON personnel. RADCON personnel will determine the specific model and type of monitoring instruments (Table 8-6) based on the type and level of contamination. Following are guidelines for personal contamination survey using hand-held instruments. Survey instructions will be posted inside the contamination RBA (if established). Consult with RADCON personnel regarding any questions related to survey instruments, techniques, or instrument alarms.

Verify that the instrument is in service, that it is set to the proper scale, and that the audio output can be heard during frisking. Personal contamination surveys will include the following steps:

- Hold probe less than 0.5 in. (1.27 cm) from the surface being surveyed for beta and gamma contamination, and approximately 0.25 in. (0.63 cm) for alpha contamination (without touching surface)
- Move probe slowly over surface, approximately 2 in. (5 cm) per second for a beta-gamma probe and 1 in. (2.5 cm) per second for an alpha probe
- If the count increases during frisking, pause for 5 to 10 seconds over the area to allow adequate time for instrument response
- If the count rate increases to a value greater than 100 cpm above background with a beta-gamma instrument or any detectable contamination with an alpha detection instrument,

remain at the step-off pad or immediate area and notify (or have someone notify) RADCON personnel

- The whole-body survey should take approximately 2 to 3 minutes. Remember to frisk hands before picking up the probe. The whole-body survey should follow this order:
 - Head (pause at mouth and nose for approximately 5 seconds to ensure the entire respirator facepiece sealing surface area of face is surveyed)
 - Neck and shoulders
 - Arms (pause at each elbow)
 - Chest and abdomen
 - Back, hips, and seat of pants
 - Legs (pause at each knee)
 - Shoe tops
 - Shoe bottoms (pause at sole and heel)
 - Personnel and supplemental dosimeters
 - Return probe to holder, facing up.

The purpose of the hand-held instrument survey is to detect surface contamination. Personnel must also have an automated whole-body survey at a PCM station before leaving the INTEC operations area or using designated eating or smoking areas.

10.5 Disposal of Contaminated PPE and Equipment

10.5.1 Storage and Disposal of Contaminated Materials

The potential exists for the generation of investigation-derived waste from the Phase I INTEC injection well drilling and sampling tasks for the OU 3-14 RI/FS based on the nature of sampling equipment decontamination tasks and waste codes assigned to the soil. Potential sources of this waste include:

- Used PPE (e.g., protective clothing, gloves, booties, and respirators)
- Small tools and equipment that cannot or will not be decontaminated or released
- Radiological controlled area materials (e.g., step-off pads, bags, swipes, and plastic sheeting)
- Decontamination waste (e.g., wipes and bags)
- Miscellaneous debris that cannot be released (e.g., plastic sheeting and tape).

Equipment that cannot be decontaminated will be bagged, labeled, and containerized in accordance with 10 CFR 835.601(a) (radiological) and CERCLA (hazardous) waste requirements, and placed in an

appropriately posted radiological or CERCLA storage area that will be established within the area of contamination. The Phase I INTEC injection well waste management activities for the OU 3-14 RI/FS will be conducted in accordance with the Phase I Waste Management Plan for the OU 3-14 RI/FS (BBWI 2000). All investigation-derived waste generated from sampling and in the decontamination process (if required) must be handled and disposed of in accordance with the BBWI MCPs, the BBWI *Radiation Protection Manual*, and either the offsite receiving facility's waste acceptance criteria (WAC) or the INEEL reusable property, recyclable materials, and waste acceptance criteria requirements (DOE-ID 1999a).

10.5.2 Site Sanitation and Waste Minimization

Site personnel will use toilet facilities located in the INTEC operations area. Potable water and soap are available within the INTEC operations area so that personnel can wash their hands and face upon exiting the work area. To prevent accidental spread of contamination, it is important that any required radionuclide contamination surveys be done before the face and hands are washed.

Waste materials will not be allowed to accumulate at the task site. Appropriate containers for contaminated and noncontaminated waste will be maintained in the EZ, in the SZ, and at other appropriate locations at the task site. All waste generated within established contamination areas must be surveyed before removal from the task site or whenever INTEC RADCON personnel think a survey is appropriate. Personnel should make every attempt to minimize waste through judicious use of consumable materials. All site personnel are expected to make good housekeeping a priority at the job site.

11. EMERGENCY RESPONSE PLAN FOR THE PHASE I INTEC INJECTION WELL TASKS OF THE OU 3-14 RI/FS PROJECT

This emergency response plan addresses OSHA “emergency response” as defined by 29 CFR 1910.120/1926.65, “Hazardous Waste Operations and Emergency Response,” and DOE “emergencies” as defined by DOE Order 151.1, Change 2, “DOE Comprehensive Emergency Management System,” and DOE Order 232.1, “Occurrence Reporting and Processing of Operations Information.” This response plan is implemented in conjunction with PLN-114, “INEEL Emergency Plan/ Resource Conservation and Recovery Act (RCRA) Contingency Plan.”

OSHA does not define the term “emergency” as it is defined by DOE Order 151.1, Change 2, “DOE Comprehensive Emergency Management System,” and DOE Order 232.1A, “Occurrence Reporting and Processing of Operations Information.” Therefore, the term “event” will be used in this section for project HAZWOPER emergencies. The “INEEL Emergency Plan/Resource Conservation and Recovery Act (RCRA) Contingency Plan” (PLN-114) may be activated in response to events at the INTEC or at the Site, or at the discretion of the emergency action manager (EAM). Once the INEEL plan is activated, project personnel will follow the direction and guidance communicated by the EAM.

Emergency response plans must be developed and put into place before any project activity begins. Preplanning makes it possible for the project to anticipate, and appropriately respond to, abnormal events that can affect the project. Preplanning also ensures that the project emergency response program is integrated with the INEEL and INTEC emergency response programs. Emergency response program elements that must be completed before starting the project include:

- Designating emergency warning signals and evacuation routes
- Implementing personnel accountability procedures
- Identifying emergency medical services and the personnel charged with performing those services
- Establishing effective site communications
- Establishing requirements for emergency equipment and supplies
- Establishing the preferred means for notifying the INEEL ERO of abnormal events.

All emergencies will be reported through the INTEC SS to the ERO for classification in accordance with Section 4 of the INEEL Emergency Plan/RCRA Contingency Plan (BBWI 1999). If the INTEC ERO is activated, site emergency response will follow the INEEL Emergency Plan/RCRA Contingency Plan, INTEC Addendum 2.

On-scene response to and mitigation of site emergencies could require the expertise of both INTEC incident response team personnel and INEEL fire department personnel. Possible emergencies include:

- Accidents resulting in injury
- Fires
- Spills of hazardous/radiological materials

- Tornadoes, earthquakes, and other adverse natural phenomena
- Vehicle or transportation emergencies
- Safeguard and security emergencies
- Emergencies at nearby facilities that could prompt evacuation or take-cover actions at the task site.

11.1 Types of Emergency Events

11.1.1 Events Requiring Emergency Notifications

Certain events may not require a response from the INEEL ERO, but require courtesy notification of the INTEC SS. In these cases, the project FTL or designee will immediately notify the INTEC SS or WCC (if the INTEC SS cannot be contacted). The FTL notification should describe the event (see Section 11.5) and state that no emergency response support is required. Examples of these types of events include but are not limited to the following:

- Minor personal injury at the site requiring medical evaluation or treatment but not requiring an ambulance response
- Equipment or vehicle accident that results in damage to the vehicle and/or property ONLY
- Any spill, as defined by MCP-439, "Facility Notification and Release Reporting"
- Any other event deemed potentially reportable.

11.1.2 Events Requiring Local Project Evacuation and/or INEEL ERO Response

Some events may require support from the INEEL ERO or may require a local area evacuation of the project. In these cases, the project FTL will immediately notify the INTEC SS. If the INTEC SS cannot be contacted immediately, then the WCC will be contacted. The FTL notification will describe the event (see Section 11.5) and will request emergency response resources as appropriate. After being informed of the event, the INTEC SS may elect to activate the emergency control center (ECC) located in Building CPP-652. Once the ECC is operational, all emergency response activities will be coordinated through the INTEC EAM. The specific actions to be taken in response to emergency alarms are described in Section 11.5. Examples of these types of events include but are not limited to, those listed below.

- Fire that is burning beyond an incipient stage and cannot be extinguished with hand-held extinguishers
- Large spill at the project that cannot be immediately contained or controlled
- Serious injury to a worker or workers
- Equipment failure or event that could potentially affect other INTEC operations or facilities.

The HSO and FTL will do a positive sweep of the remedial site for personnel accountability purposes, prior to evacuating the site. After the project site has been evacuated, the FTL will serve as the

project area warden and ensure that the INTEC SS and the EAM (if the ECC is activated) are notified that the project has been evacuated and all project personnel have been accounted for.

11.1.3 Events Requiring Total Facility and Project Evacuation

In the event of an INTEC facility evacuation, the FTL will orally (by radio or by using the local evacuation signal) notify all project personnel to evacuate. INTEC notification may be via INTEC alarms or other communication (e.g., radio) as initiated by the EAM for protective actions. The HSO and FTL will do a positive sweep of the remedial site for personnel accountability purposes, prior to evacuating the site.

If the EAM calls for an evacuation, the FTL will serve as the project area warden and ensure that the INTEC SS and the EAM (if the ECC is activated) are notified that the project has been evacuated and all project personnel have been accounted for.

11.2 Emergency Facilities and Equipment

Emergency response equipment including the items described in Table 11-1 will be maintained at the site. INTEC Addendum 2 to the INEEL Emergency Plan lists emergency equipment available at INTEC. This includes the ECC located in Building CPP-652, equipment located in INTEC, and the incident response team vehicle. Additional heavy construction and other equipment listed in PLN-114, Addendum 2, is available for use during emergencies. The INEEL fire department maintains an emergency HAZMAT response van that can be used to respond to an event or emergency at the project. Fire department personnel are trained to provide immediate hazardous material spills and medical services. At least one person with current medic/first-aid training will be present at the Phase I INTEC injection well drilling and sampling site for the OU 3-14 RI/FS during sampling tasks to render first aid if needed.

Project RADCON and IH personnel will assist with all emergency decontamination efforts. If an emergency at this site involves a temporary accumulation area, refer to the INEEL Emergency Plan/RCRA Contingency Plan, INTEC Addendum 2, Appendix L, for emergency equipment inventory information.

11.3 Emergency Communications

In the event of an emergency, the capability to summon INEEL emergency response resources, to immediately notify site personnel, and to inform others of site emergencies, is required. Communications equipment at the task site will be a combination of radios, telephones (mobile, cellular, or facility), and pagers. The INTEC SS will be notified of any project emergency event. The SS will then make the required INTEC and INEEL ERO notifications. If the INTEC SS cannot be contacted, then the WCC will be notified of the event and told that the INTEC SS and EAM have not been notified. The following information should be communicated (as available) to the SS, or to the WCC if the SS cannot be contacted.

- The caller's name, title (e.g., FTL, HSO), telephone number, pager number
- Exact location of the emergency event
- Nature of the emergency event, including time of occurrence, current site conditions, and special hazards in the area

Table 11-1. Emergency response equipment to be maintained at the project site.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers ^a	At the EZ/CRZ boundary	HSO	Monthly
First-aid supplies	SZ or project vehicle	HSO	Inspect seal monthly or immediately if seal is broken
Eyewash bottle ^b	SZ	HSO	Monthly
Eyewash station			
Hazardous materials spill kit	CRZ or project vehicle	HSO	Monthly
Radiological spill kit	CPP-659 RADCON office	INTEC RADCON	After each use
Communication equipment available	On site	FTL	Availability and daily functional check

a. A minimum of one 10A/60BC extinguisher.

b. An eyewash bottle will be used to provide an immediate eye flush if required. An eye wash station within the INTEC operations area meets ANSI Z 358.1-1990 requirements. This location will be identified by the IH during the pre-job briefing.

- Injuries, if any, including numbers of injured, types of injuries, conditions of injured
- Emergency event response resources required (e.g., fire, HAZMAT, ambulance)
- Additional information as requested.

Other project contact numbers are provided in Section 11.8.

11.4 Emergency Response Roles and Responsibilities

11.4.1 Project Personnel Involved in Emergencies

11.4.1.1 Field Team Leader. The FTL or designated alternate is responsible for initiating all requests for emergency services (e.g., fire and medical), and for notifying the INTEC SS of abnormal or potentially abnormal events occurring on the project. In addition, the FTL or designated alternate will serve as the project area warden. The FTL is responsible for personnel accountability at the project site (positive sweeps of all project areas to ensure all personnel are aware of the emergency event). All personnel will be directed to the designated assembly point where the attendance log (FTL logbook) will be used to determine what personnel are onsite (roll call). The FTL will then report accountability status to the INTEC SS/EAM.

Additionally, the FTL will control the scene at the first responder awareness level until a higher-tiered incident command system (ICS) authority arrives at the scene to take control as the on-scene commander (OSC). When relinquishing the OSC role, the FTL or designated alternate will provide all requested information regarding the nature of the event, potential hazards, and other information. The FTL will then report to the INTEC ECC and serve in a technical support capacity.

11.4.1.2 Project Personnel. Every person at the project has a role during an event or INEEL emergency. Each employee must be constantly aware of potential problems or unexpected hazardous situations and immediately report these situations to the FTL or HSO. All employees are expected to watch out for their fellow workers, to report their concerns to the FTL, and to respond to emergency events as described in this HASP. Specific project personnel responsibilities are outlined in Table 11-2.

11.5 Emergencies, Recognition of Warnings, and Response

11.5.1 Emergency Recognition and Response

All site personnel should be constantly alert for signs of potentially hazardous situations, including signs and symptoms of chemical or radiological exposures or releases. Site personnel will be trained on the methods, signals, and alarms used to convey "EVACUATION" and "TAKE COVER," and on immediate response actions.

Immediate response actions include:

- For an evacuation of the site, site personnel will assemble at a designated project site assembly area. This location will be established upwind and in the prevailing upwind direction from each site. Personnel accountability will be performed at this location.
- For a take cover at the site, site personnel will take cover in project vehicles or in an INTEC facility (whichever is closer).
- For an evacuation or a take cover at an INTEC site, personnel will follow INTEC evacuation or take-cover procedures.
- For assistance from the INEEL fire department, site personnel will call 777, which is the INEEL site emergency telephone number, or 526-1515, which is the WCC.

Table 11-2. Responsibilities of project personnel during an emergency event.

Responsible Person	Action assigned
Any project worker	Signal evacuation or take cover
FTL	Contact the INTEC SS or EAM (if ECC has formed)
FTL	Contact the INEEL site emergency telephone number or the WCC (if INTEC SS cannot be contacted)
FTL	Conduct personnel accountability and report information to the INTEC SS or ECC
Any fire extinguisher trained project worker	Extinguish fires (incipient fires only) or contain spills (within level of training)
FTL	Report incipient fires to the INEEL fire department
	Report spills to the INEEL spill notification team
Medic or first-aid trained personnel (HSO or RCT)	Provide first aid
HSO	Report occupational injuries/illnesses to the OMP

- At least one person with current medic or first-aid training will be present at the task site to render first aid. For serious injury, assistance from the INEEL fire department will be summoned. All occupational injuries and illnesses will be reported promptly to the INTEC SS.
- For incipient fires, site personnel will use available hand-held ABC rated fire extinguishers to extinguish the fire. For fires that cannot be handled with hand-held extinguishers, assistance from the INEEL fire department will be summoned. **All fires of any size will be reported promptly to the INEEL fire department even if site personnel have extinguished the fire.**
- For spills of hazardous or radiological material, site personnel will not expose themselves to hazardous conditions beyond their training and qualification for HAZWOPER. If abnormal radiological situations are present, then MCP-124, "Response to Abnormal Radiological Situations," will be followed.
- For large spills, assistance from the INEEL fire department will be summoned. All spills will be reported promptly to the INEEL spill notification team at pager #6400.
- If spills are small enough to be safely contained at the site, spill control will be handled by site personnel, who will take the following immediate spill response actions:
 - Untrained site personnel (or if the material characteristics are unknown) will:
 - **Evacuate** and **isolate** the immediate area
 - Seek **help** from and **warn** others in the area
 - **Notify** the FTL or HSO.
 - Trained site first responders at the awareness level will:
 - Seek **help** from and **warn** others in the area
 - **Stop** the spill, if it can be done without risk (e.g., return the container to the upright position, close valve, and shut off power)
 - **Provide** pertinent information to the FTL or HSO.

An RCT will survey the area to determine the extent of a radiological material spill and an IH will survey the area to determine the extent of a chemical spill.

The primary INEEL fire station is located at Building CFA-1611. Fire department personnel have response capabilities for first aid, medical emergencies, transport, fires, and hazardous material spills. Figure 11-1 shows the route to the INTEC medical dispensary. Figure 11-2 shows the INTEC evacuation assembly areas.

A local (project personnel only) tabletop emergency drill will be conducted at the start of project activity. The purpose of the drill is to familiarize employees with their respective emergency response actions. Additional drills may be conducted at the discretion of the project. Each drill or actual emergency at the task site will be followed by a critique and any deficiencies identified in the response plan, procedures, or actions will be corrected.

11.5.2 Alarms

Alarms and signals are used at the project site and INEEL to notify personnel of abnormal conditions that require a specific response. These include radiation-monitoring alarms (fast-ringing bells) and fire alarms, which vary from building to building within the INTEC area. Responses to these alarms are addressed in the general employee training. In addition to the alarms previously described, emergency sirens located throughout INTEC are the primary way to signal that emergency TAKE COVER or EVACUATION protective actions are necessary. To signal site personnel of a project-initiated emergency event, a separate set of emergency signals has been established based on hand-held air horns. These signals are described in Table 11-3.

11.5.2.1 Take Cover. Radiation or hazardous material releases, weather conditions, or other events or emergency conditions may require that all personnel take cover indoors in the nearest building or in a vehicle. A TAKE COVER protective action may be initiated as part of a broader response to an emergency situation and may precede an evacuation order. The order to TAKE COVER is usually announced by activating the INTEC emergency siren. The signal to take cover is a CONTINUOUS SIREN that can be heard throughout the INTEC area. Remember, STEADY = STAY. But the order to take cover can also be given by word of mouth, radio, or voice paging system. When ordered to TAKE COVER, project personnel will place the site in a safe condition (as appropriate) and then seek shelter in project vehicles or the nearest available INTEC building. Eating, drinking, and smoking are not permitted during take cover conditions.

Project RADCON personnel will assist and direct all workers exiting from radiological contamination areas during a TAKE COVER alarm.

11.5.2.2. Total Area Evacuation. A total area evacuation is the complete withdrawal of personnel from the project site and the entire INTEC area. The evacuation signal is an ALTERNATING SIREN that can be heard throughout INTEC. Remember, ALTERNATE = EVACUATE. A single long blast of air horn or vehicle horn serves as the project's alternate emergency evacuation alarm. However, the order to evacuate can also be given by word of mouth, radio, or voice paging system. When ordered to EVACUATE, project personnel will place the site in a safe condition (as appropriate) and then proceed along the specified evacuation route to the designated assembly area, or as directed by the EAM. Project RADCON personnel, the IH, and HSO will assist and direct all workers exiting from radionuclide-contamination areas during an EVACUATION alarm. Eating, drinking, and smoking are not permitted during emergency evacuations. For total area evacuations, the INTEC ECC is activated and all personnel gather at the primary INTEC evacuation assembly area or the location designated by the EAM. The FTL or trained alternate will then complete the personnel accountability using the attendance log. In this situation, the project area warden reports the result of the accountability process to the INTEC EAM.

11.5.2.3 Local Area Evacuation. A local area evacuation is the complete withdrawal of personnel from the project site, but it does not require the complete evacuation of the entire INTEC area. The air or vehicle horn will serve as the project's primary emergency evacuation signal (as listed on Table 11-3). However, the order to evacuate can also be given by word of mouth, radio, or voice paging system. When ordered to evacuate the project site, personnel will place the site in a safe condition (as appropriate) and then proceed along the specified evacuation route to the assembly area designated for local area evacuations, or as directed by the FTL. Eating, drinking, and smoking are not permitted during emergency evacuations.

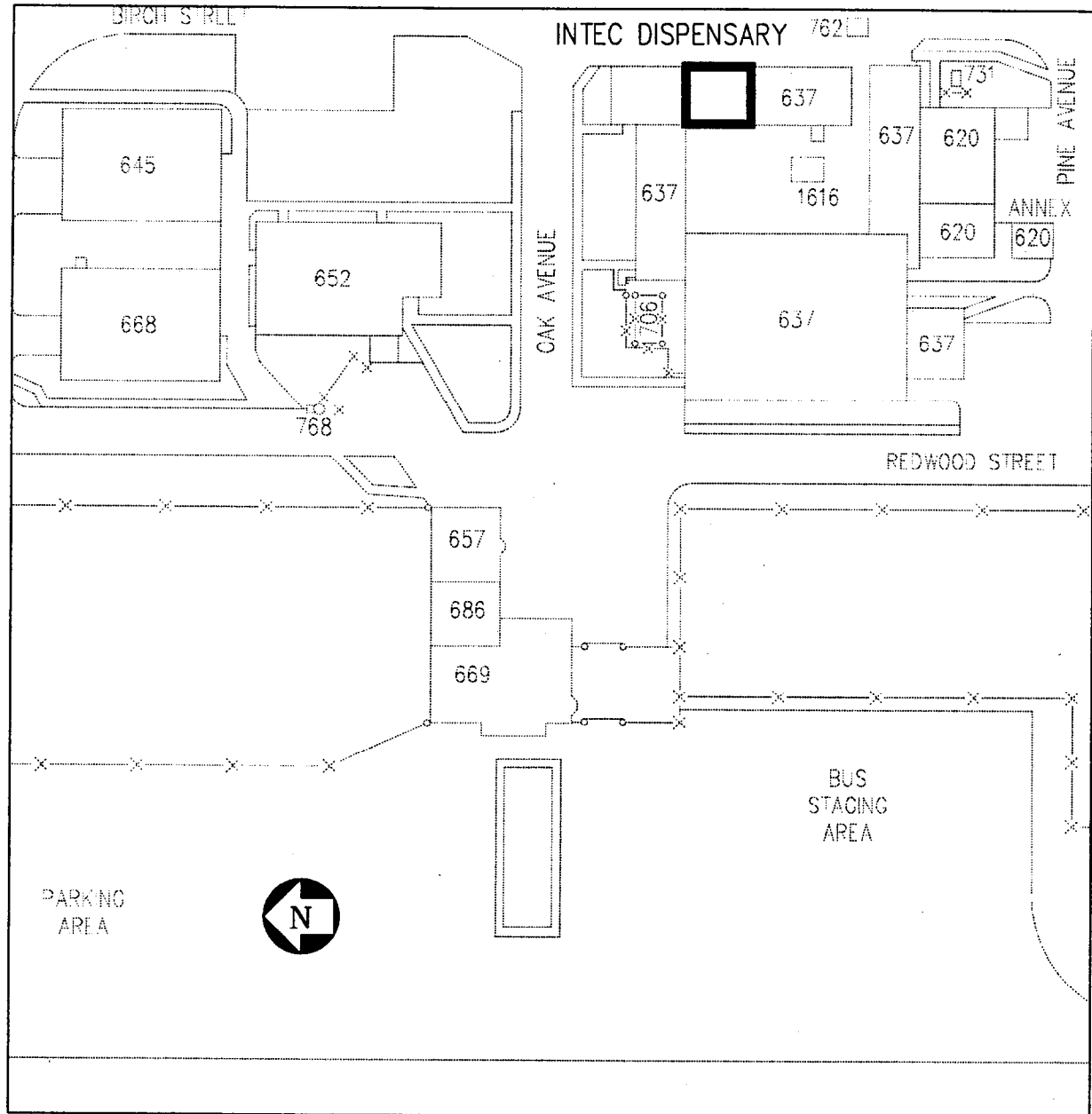


Figure 11-1. Map showing the location of the INTEC dispensary (CPP-637).

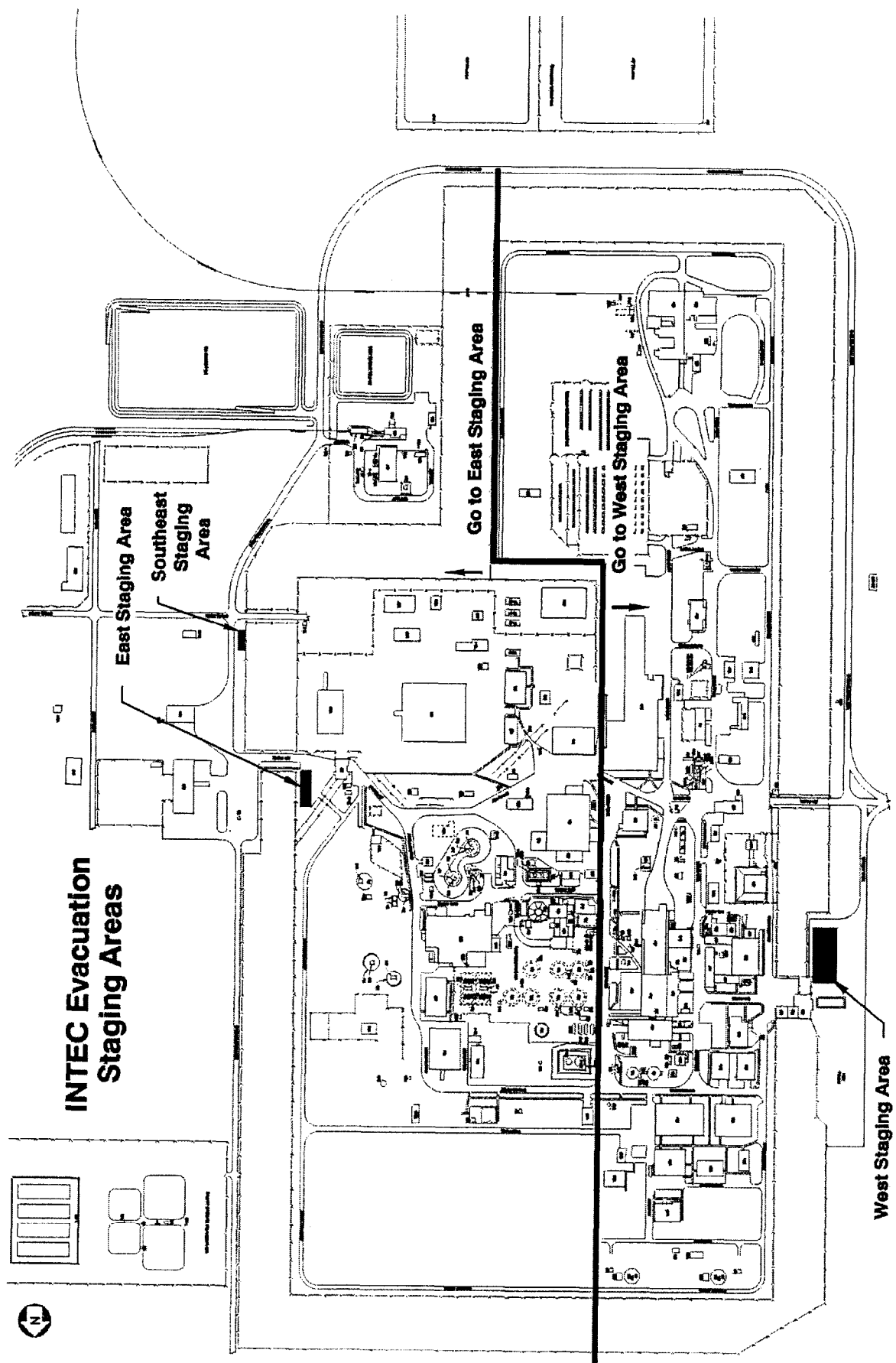


Figure 11-2. INTEC evacuation routes and assembly areas.

Table 11-3. Project internal and backup emergency air-horn signals.

Device or Communication Method	Signal and Associated Response	
Air horn or vehicle horn	<u>One</u> Long Blast	Emergency evacuation. Leave immediate area and proceed to upwind location or location designated by RCT or IH. Proceed to project assembly area or alternate location based on site-specific conditions.
	<u>Two</u> Short Blasts	Nonemergency evacuation. Leave work area, perform normal doffing of PPE and contamination surveys, then proceed directly to project assembly area..
	<u>Three</u> Long Blasts	All clear, return to site.

Project RADCON personnel will assist and direct all workers exiting from radiological contamination areas during a evacuation alarm.

11.5.3 Personnel Accountability/Area Warden

Project personnel are required to evacuate the site in response to TAKE COVER, EVACUATION, and local evacuation alarms. In each case, the FTL will account for the people on the site at the time the alarm was initiated. The FTL or trained alternate serves as the area warden for the project and completes the personnel accountability (following positive sweeps of the project site) based on the FTL logbook. The results of this accountability will then be reported to the INTEC SS or EAM (if the ECC has been formed).

11.5.4 Notifications

As directed by the office of the Secretary of Energy, the INTEC SAD is responsible for immediately notifying the DOE and local off-Site agencies of all significant abnormal events that occur at the INTEC. This duty is in addition to the notification requirements established in INEEL procedures for events that are categorized as emergencies or unusual occurrences. For this reason, the project will immediately report all abnormal events that occur on the project site to the INTEC SS. The INTEC SS will then notify the WCC, which will in turn notify the appropriate INEEL emergency response resources and other INEEL facilities. Normally the FTL is responsible for making the INTEC SS event notifications described above. The FTL may make additional notifications as listed in Subsection 11.9. Table 11-4 lists project notification responsibilities.

11.5.5 Evacuation Routes

The INTEC maintains primary and secondary evacuation routes (Figure 11-2). These routes may be used in response to a total INTEC area evacuation as directed by the EAM. Copies of the evacuation routes will be available at the site.

If the Phase I INTEC injection well drilling and sampling site for the OU 3-14 RI/FS (but not the entire INTEC area) is evacuated, personnel will assemble in the designated assembly area or as directed by the FTL. If a total area evacuation of the INTEC is ordered, then project personnel will relocate to the INTEC primary evacuation assembly area or as directed by the EAM.

Table 11-4. Project notification responsibilities.

Activity	Title	Phone	Pager	Radio
Field Team Leader (FTL)				
Notifies	INTEC SS or EAM (if the command post has been formed)	6-3100	2096	D-Net
Contingency	If the INTEC SS or EAM cannot be contacted, the FTL will make direct communication with the WCC and request all required resources (e.g., fire department, ambulance)	777 or 6-1515		KID 240
Notifies	For spills: Environmental Affairs Spill Team		6400	
Notifies	INTEC DOE facility representative	6-8838	6250	
Notifies	ER Phase I INTEC injection well drilling and sampling PM for the OU 3-14 RI/FS	6-1023	7988	
Project Manager (PM) for Phase I INTEC Injection Well Drilling and Sampling for the OU 3-14 RI/FS				
Notifies	ER director	6-4704	9175	
Notifies	INTEC ESH&QA manager	6-6925	4412	

11.6 Reentry and Recovery

11.6.1 Reentry

During an emergency response it is sometimes necessary to reenter the scene of the event. Reasons for reentry may include:

- Personnel search and rescue
- Medical first aid responses
- Safe shutdown actions
- Mitigating actions
- Evaluation of damage and preparation of damage reports
- Radiation and/or hazardous material surveys.

Reentries will be carefully planned to ensure that personnel are protected from harm and to prevent initiating another emergency event. Reentry planning is undertaken as a graded approach depending on the nature of the initiating event.

11.6.1.1 Recovery. After the initial corrective actions have been taken and effective control established, response efforts will shift toward recovery. Recovery is the process of assessing post-emergency conditions and developing a plan for returning to pre-emergency conditions, when possible, and following the plan to completion. The EAM is responsible for determining when an emergency situation is sufficiently stable to terminate the emergency and enter the recovery phase. The PM will appoint the recovery manager.

11.7 Critique of Response and Follow-up

A review and critique will follow all emergency events, drills, and exercises at INEEL. In some cases an investigation may be required prior to commencing recovery actions. For this reason, care should be exercised to preserve evidence when appropriate.

11.8 Telephone and Radio Contact Reference List

Table 11-5 lists the points of contact for the project. This list will be available in the project vehicle or FTL logbook at all times.

Table 11-5. Project emergency contact list.

Contact Title	Contact Name	Phone Number/ Radio Net	Pager Number
Warning Communications Center (WCC), fire, security		777, 6-1515	
INTEC shift supervisor (SS)		6-3100	2096
INTEC facility manager	F. S. Ward	6-3010	5432
INTEC site area director			
First Aid (CFA Medical Dispensary, CFA-1612)		777, 6-2356	
Occupational Medical Program (OMP)		6-1596	
Phase I INTEC Injection well project manager (PM) for the OU 3-14 RI/FS	T.J. Meyer	6-0730	
ER director	Lee Smith	6-4704	9175
Radiological control engineer	TBD	TBD	TBD
Industrial hygiene	Grayson Downs	6-1844	5829
Industrial/construction safety	M. Shanklin	6-5506	9129
Field team leader (FTL)	TBD	TBD	TBD
Health and safety officer (HSO)	TBD	TBD	TBD
INTEC ESH&QA manager	L. Reed	6-6504	
INTEC DOE-ID facility representative	T. W. Jenkins	6-4978	

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